

Archives of **PHYSICAL MEDICINE and REHABILITATION**

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Editor of the Month
JEROME S. TOBIS, M.D.
New York

**3rd International Congress of Physical Medicine
and**

38th Annual Session

• **American Congress of Physical Medicine and Rehabilitation**

Mayflower Hotel, Washington, D. C.

• **August 21-26, 1960**

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The following rules and regulations apply to the contest:

1. This competition is open to all persons except Members of the Boards of Governors of the American Congress of Physical Medicine and Rehabilitation, American Academy of Physical Medicine and Rehabilitation and the Program Committee of the 3rd International Congress of Physical Medicine.
2. Manuscripts must be in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, Ill., not later than May 2, 1960. This deadline will be rigidly maintained.
3. The essay must not have been published previously.
4. Essays will be judged on original work, contribution to knowledge of this subject and clear exposition of the facts. Contributions should not exceed 6000 words (exclusive of headings, references, legends for illustrations, tables, etc.) and the number of words should be stated on the title page. Seven copies of the manuscript must be submitted — two original copies and five carbon copies. No papers will be returned.
5. The winning contribution will be determined by the Program Committee of the 3rd International Congress of Physical Medicine.
6. All contributions will become the property of the American Congress of Physical Medicine and Rehabilitation and will be released to the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION for publication as determined by its Editorial Board.
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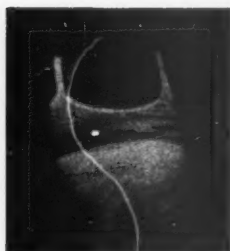
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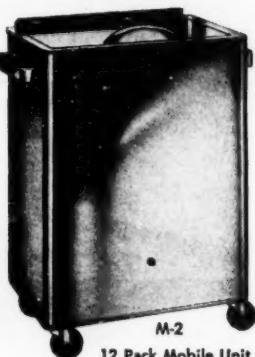


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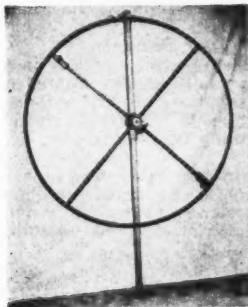


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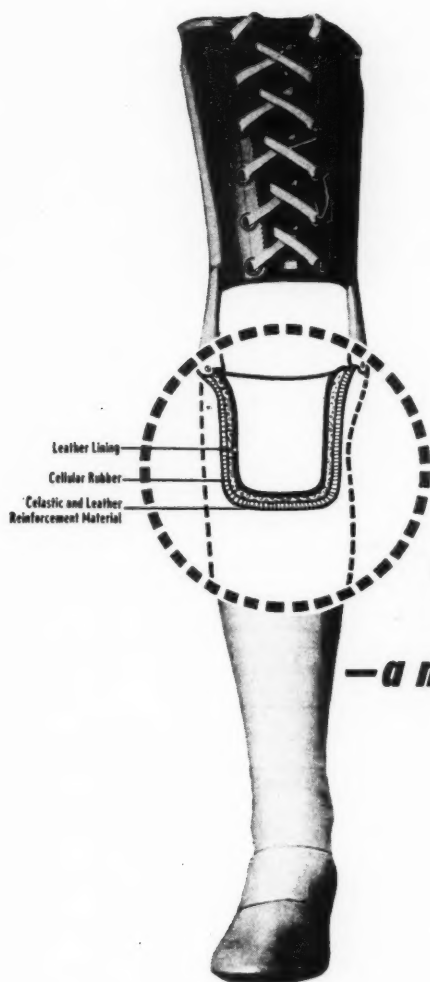
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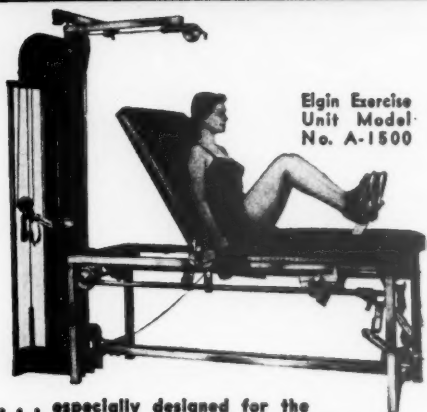
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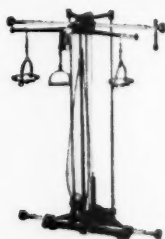


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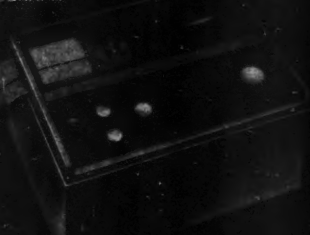
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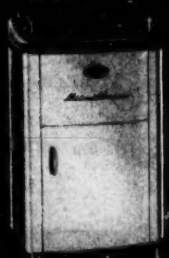
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The Honorable Richard Nixon
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PATRONESS

Mrs. Richard Nixon

The Mayflower
August 21-26, 1960

WASHINGTON, D. C., U.S.A.

Information regarding this meeting may be had from the Office of the Secretary General
WALTER J. ZEITER, M.D., or from the Executive Secretary, DOROTHEA C. AUGUSTIN,
30 North Michigan Avenue, Chicago 2, Illinois.

Social Engineering for Rehabilitation

The Honorable Orville L. Freeman
The Governor of Minnesota

● In this age of plenty, we can afford to apply the best we know — to rehabilitate lives; to educate our children to their fullest potential; to provide adequate housing, law and order, justice, and a healthy environment for the millions crowding into our cities and suburbs; to provide constructive jobs and full production; to provide for the common defense; and to provide economic assistance to peoples in foreign lands to bring them hope for higher standards under democracy and freedom. Our society can provide all these services if we but have the ability, the vision, and the courage to accept the challenge. The courage for the challenge will give rise to a new era in which men will conquer on the frontiers of human relations as they have overcome the physical hazards that beset the frontiers of human progress in ages past.

As Governor, I have been deeply interested in your particular specialty — the field of physical medicine and rehabilitation. You represent a specialty that is marked by its concern for human values and human resources — by its emphasis on not only saving and prolonging lives but also on making them more worth living. Your leaders have worked closely with us in our attempts to utilize the resources of government to best advantage in rehabilitation programs, and in our attempts to coordinate the services of a great variety of professions to make rehabilitation most effective.

In my first inaugural message to the Minnesota Legislature in 1955 I discussed the maximum development of human resources as a major goal in state government. An essential approach to that goal lies in the field of rehabilitation. Here in Minnesota we have tried to develop realistic and effective programs for both the physically handicapped and the aging, in the interest of both individual happiness and the welfare of society. I am happy to be able to report that we have made real progress in both of these areas.

In the field of services for the aging we have emphasized coordinated programs of action at all levels. We have citizens' advisory committees that really work. We have held "town meetings" to consider local needs and resources in most of Minnesota's counties. We have held two, and are planning a third, governor's state-wide conferences on aging. We have sought and achieved legislation establishing an office of Consultant on

Aging, and an official Governor's Advisory Council on Aging. We have an interdepartmental committee to consider and coordinate action. Our activities range from health care, rehabilitation, and housing to employment practices affecting our senior citizens.

In these same four years we have made really encouraging progress in the field of vocational rehabilitation. We have reorganized and more than doubled the staff in our Department of Vocational Rehabilitation. We are now successfully rehabilitating more than twice the number we did five short years ago. For their invaluable assistance in achieving these results we are deeply indebted to two of your distinguished members, Doctor Frank H. Krusen and Doctor Frederic J. Kottke, as well as to many others in the fields of education and rehabilitation.

Encouraging as it is, the progress we have made thus far is only a beginning. We know that we are far short of meeting the need, but we don't even know how far short we are. The Department of Vocational Rehabilitation reports that there are 300,000 handicapped in Minnesota, and 22,000 unemployed handicapped seeking work. Last year a medical survey of the homebound in one Minnesota county discovered that out of 155 homebound persons, 49 — nearly one-third — were unknown to either county welfare agency or county nurse.

We do know that the potential is great. Uncounted thousands could be found and given the benefit of rehabilitative services now available. Invaluable progress in new discoveries and scientific development could be expected if we dedicated enough money, effort, and talent to research. It is a herculean task of social engineering to bring together the scientific know-how and the human beings who could benefit from its application. You, who are experts and

Read at the Thirty-seventh Annual Session of the American Congress of Physical Medicine and Rehabilitation, Minneapolis, September 2, 1959.

specialists, can report much more adequately on the physical potential in this field. Your successes already offer great inspiration and hope.

It is in my field, in government, to work at that task of social engineering. My purpose is to suggest to you that this great potential for progress in your field of physical medicine and rehabilitation is only a part of the great potential for progress in every field of human interest today.

It is our task to make that potential a reality. My thesis is that we *can* achieve that potential, because we in the United States are today living in an age of plenty. But we can achieve it only if we first achieve public understanding of the progress that is possible, and public recognition of the importance of working toward that end.

An Age of Plenty

What do we mean by this age of plenty? Does it mean that we, here in the world's richest land, have all we need or want?

Not quite. But it means that we have the potential to get it.

The age of plenty means that we have more than enough to live on. We have potential productive capacity so much greater than we are using that we are allowing at least one-fifth of that capacity to go to waste.

Science and technology have progressed so far that, for the first time in the history of man we can see the possibility of conquest of hunger and cold and the other physical and natural hazards of life for all men everywhere. And within the United States of America this possibility has become a reality. We no longer simply produce as a means to the end of supplying needs. Rather we have a billion dollar advertising and public relations industry to persuade us to want more — and more billions of consumer credit to enable us to buy it on easy terms.

I would like to refer briefly to a few of the principal factors that highlight this potential for plenty. We have experienced a real breakthrough in the production of power. With the utiliza-

tion of nuclear energy we are harnessing the power of the universe — in fact, our greatest fear today is that we have at hand power greater than we can trust man to control. Scientists tell us that we will soon utilize solar energy to great economic advantage. Human muscles need no longer submit to backbreaking drudgery. Men, women and children need no longer do the physically hard and difficult jobs. "Megaton" is replacing "horsepower" as a measure of energy.

The development of automation is another breakthrough. Our use of machines to run machines — our perfection of mechanical brains — promises a revolution of much greater consequences than those which followed the industrial revolution of the 18th century. And the economic, social, and political changes that will accompany automation will be equally as great.

These sensational developments have been accompanied by tremendous scientific and technological advance in the use of the more familiar sources of power and productive technics. And economic and political changes in the United States within the past generation have so substantially increased the real income of most Americans that we are enjoying a standard of living and a supply of material goods undreamed of by our grandparents. Our standard of living has increased four-fold in the last seventy-five years, even though our hours of labor have been shortened.

This abundance has come upon us with astounding rapidity. Developments in technology and progress toward plenty are, of course, as old as the human race. But their rate of acceleration has increased phenomenally during the present generation.

Let us, for a moment, consider that rate of acceleration by compressing the 50,000 years of man's recorded history into a time span of fifty years. We know very little about the first forty years, although perhaps during the last of that period the most advanced men learned to use skins for clothing. About ten years ago, man emerged from his caves and constructed some other kind of shelter. Five years ago he learned to write.

Christianity began less than two years ago.

Less than two *months* ago, during this whole fifty-year span of human history, the steam engine provided a great new source of power. Automobiles and electric power became significant only during this past month. And last week we developed nuclear power!

This rapidity of recent progress is thrilling—but like many thrills, it is dangerous. Its danger lies in our failure to adapt our social, economic and political thinking to the new situation.

Where Are We Failing?

At the present time, we in the United States are failing to take advantage of this potential of plenty. In the first place, we are not achieving full production, and we are therefore failing to achieve the economic growth we should have. During the period of 1953 through 1958 as a whole the average annual growth rate in national production was only 1.3 per cent. This was only about 40 per cent of the long-term historical average during the past four decades. It was less than one-third of the annual growth rate of $4\frac{1}{2}$ per cent by which we did increase our production during the years just preceding 1947-53. It therefore fell frighteningly short of the increase of between 4 and 5 per cent that economists believe we should have if we are to maintain full employment and sustain a rising standard of living for our rapidly increasing population.

This appallingly deficient rate of growth has meant a loss of more than 150 billion dollars in total national production when compared with what an adequately high rate would have produced. It has meant an extra 10 million man-years of unemployment. It has meant almost \$3,000 less income for the average American family. It has meant a loss of 30 or 35 billion dollars of revenue for federal, state, and local governments that would have been forthcoming at existing tax rates. And this loss of revenue has led to questions as to whether we could "afford" programs that are absolutely essential to national

security, and domestic programs that are of crucial importance to our future.

This leads to the second, and perhaps more serious, evidence of our failure to meet the challenge of plenty. We are cursed; not with plenty, but with poverty, in our public services. Even with our failure to achieve full production, many people would look about them, view the two cars in many garages, note the many gadgets in most households, and say that it seems that we do have a great abundance. It seems we have more than we need, so much more that advertisers must spend billions to get us to use what we do have.

There is much truth in the suggestions that many have more than they need in the field of private goods. But none of us has all he needs in the field of public services. It is in this social imbalance that there lies the most serious danger to our society. And it is this social imbalance that I am about to ask you to help to redress.

Social Imbalance

I know of no better recent exposition of the grave plight of public services in our economy than that made by John Kenneth Galbraith in his recent book, "The Affluent Society." Galbraith illustrates the contrast between our poverty in public services and our affluence in private goods. He discusses those forces that cause public services to fall behind private production. He points out the dangers that result.

Galbraith is not alone in pointing out how far public services have lagged behind private growth. The Rockefeller Report points out that today the ratio of public works expenditures to the gross national product is only two-thirds as much as it was in the late thirties. And any governor who has tried to formulate a budget, who has listened to the urgent need for services for education, for mental health, for increased public effort to prevent the social ills of crime and delinquency, knows at first hand how deeply serious is our need for public services.

Evidence of this social imbalance is all around us. In the years just past, hun-

dreds of millions of dollars have been spent on designing bigger and more conspicuous automobiles, although the ones we had were already too big for our parking spaces and our garages. Yet during those same years, our children suffered for the lack of thousands of new classrooms; and the years of better educational opportunity that they lost during those years can never be recovered. It is considered a mark of prestige to build a beautiful home, but it is often considered a mark of reckless spending to keep the street on which the home is built well-lighted and well-policed. We willingly pay to private enterprise the price of a good vacation, but we begrudge what we must pay to keep our highways, parks, and lakes up to standard, because these are things we pay for through taxes.

Public services are suffering today in several areas of utmost importance. I have already referred to education. We have more children to educate, proportionately, than ever before. Our children need more and better education than ever before. Yet we are frighteningly behind in both facilities and personnel with which to provide that education. We have more aging citizens than ever before, and we are beginning to learn what their needs and wants are, and how they can live longer, happier and more productive lives. We must learn more, and put that knowledge into practice. We are rapidly learning more about health, both mental and physical, yet we desperately need more research that would lead to great strides in prevention and cure, and more services that would make the knowledge now at hand available to all. Our rapidly growing cities and suburbs need public services of all kinds, from sanitation in the newly developing areas to slum clearance and redevelopment in the old sections. We need more and better trained officials to enforce the law, to work on prevention as well as detection of crime, to provide better probation and parole services. And for our own security, perhaps our own survival, we need to finance more adequately our preparations for defense and for waging the economic war

abroad. These services are important. They are vital. They can be provided only by government. Yet we in the United States are not supporting them adequately.

Why Are We Failing?

If these public services are so critically essential to our progress, to our security, and even to the survival of our democratic way of life, why are we failing to provide them? Unless we know the reasons we cannot intelligently present our case for improvement.

One reason for our failure is that too many of those in positions of leadership are prisoners of the past. They have not yet awakened to the great changes that are taking place. They fear the challenge that these changes present, and in their fear they seek to retreat to the good old days when the old rules and the old technics prevailed. They try to apply these old rules that developed during centuries of scarcity to the new age of plenty. They lack the courage and the vision to seek new rules and new technics to meet the challenge of today.

A part of this retreat to the past is evidenced by the current utilization of the fear of inflation to oppose increased public services. I want to make it perfectly clear that I oppose inflation. I know how regressive it is, that its consequences are most serious for the weaker elements in our economy. But I refuse to fall for the myth that we must choose between inflation on the one hand and inadequate expenditures for education and health on the other. I refuse to accept the fallacy that we must restrict production and accept unemployment in order to avoid inflation. I insist that we must be ready to spend all we need to spend for defense and for foreign aid in order to win the cold war. And if it does come to a choice — *I would rather have a 40-cent dollar than communist victory.*

But I do not think we need make that choice. We have, in the year just past, experienced the amazing spectacle of an increase in the cost of living during a recession. The old tight money technics have not stopped price increases. Nor did the slump in demand prevent those

increases, because they occurred mainly in fields where prices are administered — where prices are privately fixed by means of monopoly control. We should therefore be prepared to fight any threat of a new kind of inflation in a new age of abundance by methods that will work to stabilize prices but will not impose on us the frightful cost of unemployment, deficient growth, and inadequate public services. Leading statesmen and economists are working out such methods. Certainly if inflated prices occur primarily in areas of administered prices, as is the case at present, then the logical approach would be some kind of control, some way to bring the public interest to bear on those private interests that exercise their monopolistic power to fix prices. Another major reason for our failure in the field of public services is the current attitude toward government spending and the effect of that attitude on political leaders and elected officials.

A Conscious Choice

Not long ago there appeared on my desk an appeal by the Chamber of Commerce of one of our large cities to its members; an appeal to exert pressure on the U. S. Congress to prevent spending. It happened that the expenditures Congress was then considering related to (1) housing, which that city needs; (2) highways, which it also needs; and (3) foreign aid, which is critically needed for security. Housing, transportation, and the defense of our freedom! Our homes, our business and pleasure, our survival! These are all things of great value, essential to our way of life. Why do we subordinate them to private spending for new clothes, new cars, and new gadgets, just because we must buy them through government? During our last legislative session I tried to secure passage of the withholding method of collecting income tax. This was defeated, and the opposition said it would make it "too easy" to collect the tax. Now in Minnesota our income tax goes for education. Why should we glorify easy payments and the installment plan for the purchase of gadgets and luxuries, and deny easy payments for the education of our children?

Why should we spend billions to *persuade people to buy* TV sets and vacations to bring more happiness and pleasure into their lives, and at the same time deny and decry spending that would enable us to prevent and cure the mental illness that causes so much pain and unhappiness? Why should we spend millions for cars for our teen-agers, and deny the spending for education, for rehabilitation, for slum clearance, and for better correction programs to prevent juvenile delinquency? Why should I, or any other elected public official, who makes a speech like this urging the importance of public services for health, education, urban development, and all the other things most people really want, have to run the risk of political opposition and political defeat on the charge of "tax and spend"?

The answer is both simple and complex. People do not realize what their government services provide or their tax dollars buy. There are, in my opinion, very few parents who would *consciously* choose a new appliance *instead* of a good education for their children. There are, in my opinion, very few Americans who would *choose* lower taxes *instead* of security against communist victory.

Under our free American system the people must choose. And their choice is being influenced — daily and hourly — by the expenditure of uncounted billions to pay brilliant people to think up new ways to advertise new things and to persuade them to buy more private goods. The people pay for this huge expenditure, and pay willingly; *for it is not called taxes.*

We Can Afford A Future

Who will present the case for public goods and services? I believe that it is an obligation of public officials and political leaders to present this case. Unless elected officials have the courage to present that choice honestly and clearly the people cannot be expected to choose wisely. But if there is any rule of politics that is more widely accepted than the others it is the political folly of advocating spending for public services. Unless leaders of opinion will support such ac-

tion on the part of public officials; unless men like you, aware of the needs and the potential in your own field of rehabilitation, will help to educate the public as to the significance of the choice they make, we cannot hope to have public officials who will try to do it alone. Your influence can be of great importance, not only in your own field, but in the broader fields I have described.

In your own field of expert knowledge, we stand ready to achieve great gains. Economists and statisticians tell us that within forty or fifty years, unless we take steps to change present practices, each one of us who engages in productive work will have to support one person who is chronically ill, disabled, or over-age. If this ratio of productive and non-productive adults were to suddenly come about tomorrow our standard of living would have to drop by forty per cent. This measures, in a degree, the economic loss of the productive ability of older and disabled individuals. But it is impossible to measure the social and spiritual loss resulting from the failure to apply the best we know in the field

of rehabilitation to all human beings, regardless of age.

In this age of plenty, we can afford to apply the best we know — to rehabilitate lives; to educate our children to their fullest potential; to provide adequate housing, law and order, justice, and a healthy environment for the millions who are crowding into our cities and suburbs; to provide constructive jobs and full production; to provide for the common defense; and to provide economic assistance to peoples in foreign lands to bring them hope for higher standards under democracy and freedom.

Our society can provide all these public services if we but have the ability, the vision, and the courage to accept the challenge of plenty. We can then look forward to the dawning of a new era in which men will conquer on the frontiers of human relations as they have overcome the physical hazards that beset the frontiers of human progress in ages past. If we can contribute to success on these new frontiers, we will have helped to achieve the ideals of peace and progress that are among the most cherished goals of all men.

NOW AVAILABLE . . .

Preliminary prospectus of the 3rd International Congress of Physical Medicine scheduled for Washington, D. C., August 21-26, 1960.

A copy of the prospectus may be had on request by writing to Walter J. Zeiter, M.D., Secretary General, or Dorothea C. Augustin, Executive Secretary, 3rd International Congress of Physical Medicine, 30 N. Michigan Ave., Chicago 2, Illinois.

Rehabilitation of the Bladder in Injuries of the Spinal Cord

Walter C. Stolov, M.D.
Minneapolis

● Results on 59 patients with spinal cord injuries treated in the University of Minnesota Rehabilitation Service in the last four years are reviewed. Sixty-four per cent of these are catheter-free. Of those admitted with catheters, 58 per cent were converted to a catheter-free status. Patients with autonomous bladders had a greater conversion rate than did those with reflex bladders. Seventy-four per cent of those with incomplete lesions converted compared to 59 per cent of those with complete lesions. The average length of time after injury for the patients to become catheter-free was seven and one-half months. Patients with upper motor neuron lesions converted in six months and those with incomplete lesions made the transition in three months. Ischemic ulcer was the major cause of failure to attain catheter-free status and vesical lithiasis was the most frequent urinary tract complication. The physiology of micturition with respect to the sacral spinal reflex center is reviewed, and techniques of treatment are discussed. The treatment program that has evolved in the care of the cord bladder is presented.

In the hours immediately following trauma to the spinal cord the physician works energetically to save a life. The tremendous disturbance of the patient's central nervous system necessitates that energetic care continue beyond the immediate life-saving stage. Successful management in the first six months usually will determine the ultimate success of rehabilitation. Of all the problems that exist, the care of the urinary system is one of the most important.

Dietrick and Russi¹ reviewed autopsy findings in 55 paraplegic patients and found that renal disease was the most common primary pathological diagnosis. Genitourinary disease was present in 90 per cent and ischemic ulcers in 69 per cent of the patients. Renal clearance studies on 62 paraplegic patients revealed a reduction of 50 per cent or more in either glomerular filtration rate or renal plasma flow in those patients who had had lesions for more than five years.² Blood urea nitrogen and intravenous pyelography were not sufficiently sensitive to detect this deterioration. Better renal function occurred in the absence of catheter drainage.

In treating the paraplegic patient the ultimate goal is to obtain as soon as possible a functioning bladder characterized by: (1) a catheter-free existence, (2) an adequate capacity with a negligible residual urine, (3) socially acceptable urination, and (4) absence of

infection. Unfortunately, however, this goal is too infrequently obtained; complications often lead to less-than-ideal medical and social results.

This study reviews our experience at the University of Minnesota Rehabilitation Center in the management of urinary problems of traumatic quadriplegic and paraplegic patients.

Physiology of Micturition

In the normal adult micturition is a reflex act subject to voluntary control. The forces of expulsion and retention are reciprocally balanced at all times. The higher brain centers can facilitate or inhibit these forces at will.

The two types of urination, namely, on desire and on command, are distinguished by their respective sequences of events. On desire, the contraction of the detrusor is associated with the opening of the internal sphincter, followed by relaxation of the external sphincter and the muscles of the pelvic floor. The sequence of responses on command is still in dispute. One view³ holds that central facilitation initiates contraction of the detrusor and that this is followed by relaxation of the pelvic floor with lowering of the base of the bladder. The vesical neck then opens and the external sphincter is subsequently relaxed. In the other, more recent view,⁴ voluntary voiding starts with an increase in abdominal pressure mediated by the diaphragm or the abdominal muscles or both. Relaxation of the pubococcygeus muscle follows and the vesical neck drops down initiating reflexly a wave of contraction over the detrusor. Opening of the vesical neck and relaxation of the external sphincter then follow as before.

The sympathetic nervous system is

This contribution received the Sixth (1958) Annual Essay Award of the American Congress of Physical Medicine and Rehabilitation.

National Foundation Fellow in Physical Medicine and Rehabilitation, University of Minnesota Medical School.

unnecessary for micturition either in normal or in pathological states. It is sometimes helpful in low thoracolumbar lesions of the spinal cord in conveying the sensation of bladder distention. Reflex voiding is mediated by the parasympathetic and the somatic innervation. The parasympathetic preganglionic fibers originate in the second through the fourth sacral segments of the anterior and lateral horns, leaving via the anterior roots to the pelvic nerves and plexus and synapsing with the postganglionic fibers in the vesical plexus. The somatic lower motor neurons arise in the same anterior horns and possibly one to two segments above and below, and course via the anterior roots and pudendal plexus through the internal pudendal nerves to the striated muscles of the external sphincter and the pelvic floor. The sensory input of both systems enters the spinal cord at the same level as the motor output.

The reflex centers concerned with micturition are divided into three parts: (1) peripheral intrinsic ganglia within the detrusor, which maintain bladder tone with increasing volume independent of central stimulation (it is also believed, however, that adjustment of the bladder to increasing volume is purely myogenic⁶); (2) the spinal reflex center located in the sacral cord; and (3) the supraspinal centers located in the hypothalamus, limbic system (visceral brain), and midbrain which condition and control the spinal reflex center.

Of prime importance in the paraplegic patient is the spinal center, for it becomes the sole source of coordinated voiding in the absence of the regulatory mechanisms in the brain. Six important reflexes can be described within the spinal center (fig. 1):^{3,6,7}

1. As the bladder fills with urine, tension within the bladder wall increases. At threshold tension, intramuscular afferents are stimulated, sending impulses to the sacral parasympathetic center via the pelvic nerves. Efferents return along the same route and initiate detrusor contraction.

2. Proprioceptive fibers from the contracting detrusor send impulses to the

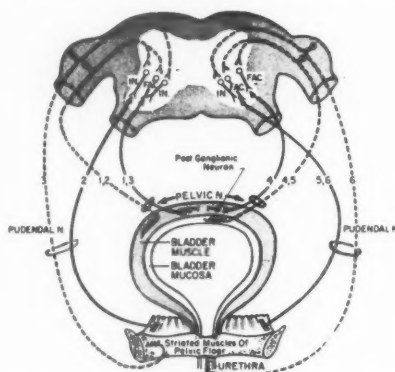


Fig. 1 — The sacral spinal reflex arcs of micturition. (1, 2, 3, 4, 5, 6 reflex numbers, see text; broken lines, afferent nerve; solid lines, efferent nerve; IN., inhibitory internuncial neuron; FAC., facilitatory internuncial neuron.)

spinal center again via the pelvic nerves which synapse with and inhibit the somatic lower motor neurons of the external sphincter. The motor impulses of the pudendal nerve are inhibited and the pelvic floor relaxes.

3. Contraction of the external sphincter and pelvic floor stimulates proprioceptive fibers which traverse the pudendal nerve and plexus and inhibit the preganglionic parasympathetic fibers to the detrusor. The motor impulses of the pelvic nerve are inhibited and the detrusor relaxes.

4. Exteroceptive fibers within the bladder mucosa on chemical, thermal, and possibly mechanical stimulation facilitate detrusor contraction via the pelvic nerve-pelvic nerve arc.

5. The same exteroceptive impulses from the mucosa are facilitatory to pelvic floor contraction via the pelvic nerve-pudendal nerve arc. This reflex has a lower threshold and is more easily abolished by mucosal anesthesia than the arc that facilitates detrusor contraction.

6. Sensation in the urethra excited by thermal stimuli and the passage of urine inhibit the tone of the anterior portion of the internal sphincter and the external sphincter and promote their relaxation via the pudendal nerve-pudendal nerve arc.

Facilitation of detrusor contraction by impulses originating from the urethra is believed not to be present in man.

Reflex spinal voiding requires conditioning of these six facilitatory and inhibitory reflex arcs in order to establish a smooth succession of events. Excessive facilitation can lead to small spastic bladders that discharge urine with excessive frequency, while too much inhibition produces bladders with poor emptying contractions, multiple urination, and high residual urines.

Spinal cord trauma above the conus medullaris does not injure the sacral spinal reflex center. The reflex bladder is defined as one with physiologically intact neural connections to the sacral reflex center. Trauma to the conus medullaris or cauda equina may destroy the reflex arcs creating the autonomous bladder. Bors⁷ describes the bulbocavernosus reflex as a test of the integrity of the spinal sacral reflex center. Its presence aids in determining whether an injury in the lower thoracic or lumbar vertebrae has traumatized the conus or cauda equina and resulted in an autonomous bladder. Stimulation of the glans penis, vesical and urethral mucosa, or of the detrusor produces contraction of the pelvic floor musculature and the anal sphincter. Tugging on an indwelling catheter will initiate this reflex.

Intervention in Bladder Function

Regardless of the system used in the rehabilitation of the bladder, adequate function does not always result. Surgical and non-surgical methods are available to assist the development of a catheter-free status. These techniques perform one of three functions: (1) correction of abnormalities of the upper and lower urinary tract, (2) modification of reflex activity, and (3) elimination of the reflex arcs.

Vesical neck obstruction is one of the more common abnormalities encountered, and transurethral resection of the vesical neck is frequently employed to reduce resistance to urination.

Various drugs are utilized to modify reflex activity. The parasympathomimetic drugs act at the myoneural end

plates. The parasympatholytic preparation may act at the end plates or at the ganglia, inhibiting the effect of acetylcholine. Anesthesia of the vesical mucosa with a 0.25 per cent solution of tetracaine modifies the spinal reflexes described previously in paragraphs numbered 4 and 5, inhibiting the spastic detrusor and relaxing the pelvic floor to promote a larger bladder capacity and a smaller residual urine. Curiously, this improvement may be permanent.⁸ Pudendal neurotomy modifies spinal reflexes (2), (3), (5) and (6) reducing outflow resistance at the anterior portion of the internal sphincter and at the external sphincter, relaxing the pelvic floor, and blocking reflex inhibition of the detrusor to produce a more sustained detrusor contraction. Selective sacral neurotomy may modify all the spinal reflexes and is indicated primarily for the spastic detrusor. Fortunately, prior to operation the effects of pudendal and sacral neurotomy can be determined by pudendal and sacral anesthetic blocks. A series of successful anesthetic blocks may be capable of permanently modifying reflex activity. Anterior rhizotomy of the tenth or eleventh thoracic nerves to the fifth lumbar or first sacral modifies sacral reflex activity by eliminating mass reflex responses of the lower extremities.

If a competent reflex bladder does not develop in a patient physically capable of exerting manual pressure on the bladder, creation of an autonomous bladder is indicated. Subarachnoid alcohol block of the conus, anterior or posterior sacral rhizotomy, or sacral cordectomy may be performed to abolish all sacral reflex activity. The effect of these procedures may be determined preoperatively by spinal anesthesia. After creation of an autonomous bladder, widening of the internal meatus may be necessary to lessen resistance to voiding.

Bladder Rehabilitation Program at University Hospitals

The care of the genitourinary tract begins on the first day of admission. The dangers of inadequate care are emphasized to the patient. His cooperation is essential. A fluid intake of 240 cc.

(a full glass) every hour from morning until bedtime is established immediately to provide an intake of at least 3,000 cc. daily for each patient. The in-dwelling catheter is attached to continuous drainage and changed weekly and the bladders are irrigated four times a day with sterile saline. The penis is taped to the abdomen to straighten the penoscrotal angle in an effort to prevent urethral diverticula. To avoid distention, continuous drainage is maintained during the so-called atonic phase when detrusor contraction is absent.

When detrusor activity appears, tidal irrigation or catheter clamping or both may supplant continuous drainage in selected patients. If a patient is aware of vesical contractions and can immediately institute drainage, the urethral catheter may be clamped. Tidal drainage is effective as an irrigator and in increasing the capacity of the small irritable spastic bladder. Because of concurrent physical restoration treatment, it is practical on a rehabilitation service only at night and on weekends.

Excretory urography and retrograde cystourethrography are done early and repeated as necessary. Cystoscopic examination together with other urological procedures are performed as indicated.

The return of detrusor activity is determined by retrograde cystometry. A continuous drip of about 200 drops per minute to a volume of 400 cc. is usually sufficient for significant observations. The magnitude and duration of detrusor contractions are observed on the water manometer. The most effective cutaneous stimulation that will initiate reflex detrusor contraction is also observed. Cystometry is performed every three to four weeks until detrusor activity is apparent. Since leakage around a catheter may be due either to impaired drainage or to detrusor contraction, the catheter is changed and cystometry is performed whenever such leakage is observed. As soon as contraction of the detrusor appears to return, the catheter is removed. If a high residual urine is present, catheter drainage is reinstituted and additional voiding trials are made at two-week intervals. If detrusor

activity is adequate but voiding is not, sphincterometry may be useful. The catheter is withdrawn to a point just distal to the external sphincter and the pressure required to force irrigating fluid past it is measured.

In injuries of the lower thoracic and lumbar vertebrae, the conus or cauda may be damaged, creating an autonomous bladder. Detrusor contractions in this situation are insufficient for emptying. Voiding will require Credé expression or increased intra-abdominal pressure. The catheter is removed as soon as the general physical condition permits and voiding is attempted. Transurethral resection of the vesical neck may be necessary to eliminate residual urines.

After the catheter is removed, the patient voids at scheduled times. The schedule is subsequently adjusted to correspond with his rate of urine production while still maintaining the high fluid intake. Capacity is best determined from amounts voided plus residual rather than by retrograde filling, since retrograde filling is not very physiologic and may give values that are too low.⁹

Infection appears rapidly after initial catheterization and the urine rarely becomes sterile even after the patient becomes catheter-free. Long-term antibacterial medication is indicated to control infection. Sulfonamides, urinary antiseptics, and, in problem cases, one of the broad-spectrum antibacterial drugs may be rotated at monthly intervals and if necessary continued intermittently for life. The broad-spectrum antibiotics are usually reserved for acute febrile urinary infections.

In order to reduce the incidence of calculi, the following regimen is followed: (1) a fluid intake of at least 3,000 cc. per day, (2) maintenance of acidity of the urine, (3) catheter changes weekly or oftener if there is encrustation, (4) elimination of milk from the diet, (5) administration of one ounce of aluminum gel four times a day with meals and at bedtime to reduce phosphaturia by binding dietary phosphorus,¹⁰ and (6) oral administration of salicylates since they are excreted as glucuronide

Table 1: Bladder Status of All Patients with Spinal Cord Injuries Seen from 1954 to 1958 (Group I plus Group II)

	No. Patients	No. Catheter-free	Per Cent Catheter-free
Total	59	39	64
Males	47	32	68
Females	12	7	58
Complete lesions	32	19	59
Incomplete lesions	27	20	74
Reflex bladders	52	33	63
Autonomous bladders	7	6	86

Table 2: Frequency of Conversion to Catheter-free Status

	Patients Admitted with Catheters (Group I)	No. Converted to Catheter-free Status	% Converted
Total	48	28	58
Cervical lesions	24	11	46
T1 - T9 lesions	12	7	58
T10 - S5 lesions	12	10	83

complexes which increase the solubility of calcium salts.¹¹ (Vermeulen and co-workers¹² have not found a significant increase in solubility at the usual therapeutic levels of salicylate.)

The question of how long one should wait for adequate reflex elimination to develop before intervening is a difficult one. A fair standard is either six months after injury, or two to four months after the appearance of detrusor contraction, whichever occurs later.

Clinical Results

A small general rehabilitation center is not specifically geared to handle only patients with injuries to the spinal cord. Moreover, if there is a significant turnover of medical and nursing personnel, the procedures and general care cannot be as complex as they may be in centers devoted exclusively to spinal cord injuries. It is within such a framework—a small center with frequently changing staff—that the University of Minnesota Hospitals Rehabilitation Service has operated since it began in September, 1954. The bladder program described has evolved over a four-year period and, therefore, all patients seen were not uniformly treated.

A total of 59 hospitalized patients with traumatic spinal cord lesions have been treated. Follow-up examination was not possible in 18 patients because of limited

mobility and distance from the hospital. Since we have not heard to the contrary, it is assumed that these patients are doing at least as well as on discharge and are included in the series. Of the 59 patients, 48 (Group I) required catheter drainage when admitted. The remaining 11 (Group II) had achieved catheter-free urination prior to admission.

In table 1 the 59 patients are classified according to sex, type of cord lesion (complete or incomplete), and type of bladder (reflex or autonomous), and the number and per cent of those catheter-free when last seen, within each category, are listed. Eighteen of the males, who did not require catheters, used rubber urinals because of frequent and precipitate micturition. A lesion was considered incomplete if at least one sensory or motor modality was functioning below the level of the cord injury. Males did slightly better than females, although the much smaller number of females in the group weakens the comparison. Patients with incomplete lesions achieved more favorable results than those with complete lesions. Reflex bladders occurred with much greater frequency than autonomous bladders but appeared to be less successfully managed without catheter drainage.

In table 2 the patients in Group I are classified according to the level of

the cord lesion. (The breakdown given is preferred to a simple cervical, thoracic, and lumbar classification because patients with lesions below the tenth thoracic vertebrae begin to show significant ambulation potential.) The number in each category that converted after hospitalization to a catheter-free existence is listed. The combined conversion ratio was 58 per cent and the patients with lower thoracolumbar lesions did significantly better than those with higher level injuries.

The period between the time successful patients in Group I were injured and the time they became catheter-free varied from 9 days to 26 months, with an average of $7\frac{1}{2}$ months. The average was $12\frac{1}{2}$ months for the 6 autonomous and 6 months for the 22 reflex bladders. The average for the 14 patients with incomplete lesions was 3 months, and for the 14 with complete lesions, 12 months.

In all patients, urinary tract infection of variable clinical severity was present, but due to uncertainty in diagnosis, no accurate determination of the number of patients with acute or chronic pyelonephritis and cystitis was possible. Other genitourinary complications occurred in 25 patients (42 per cent.) In order of frequency the following appeared: vesical lithiasis in 18 (30 per cent), urethral diverticula in 6 (10 per cent), orchitis and epididymitis in 4, vesical diverticula in 3, renal lithiasis in 2, nonfunctioning kidney in 2, hydro-nephroses in 2, vesicoureteral reflux in 1, urethral stricture in 1, calculous obstruction in 1, and ureteropelvic obstruction in 1.

Discussion

In Bors' series¹³ 74 per cent of 844 patients, in Comarr's series,¹⁴ 47 per cent of 180 patients, and in Swartz's series,¹⁵ 74 per cent of 78 patients were converted to a catheter-free existence. The 58 per cent conversion ratio reported here compares favorably, although room for improvement exists. Twenty-nine per cent of Bors' catheter-free patients and 25 per cent of Comarr's discarded their catheters with the assistance of one of the intervention methods. In the University of Minnesota series, six

patients (15 per cent) became or remained catheter-free through intervention. Three of them had vesical neck resections; one had tetracaine anesthesia, lumbar anterior rhizotomy, and urethral diverticulectomy; one had vesical neck resection and urethral fistulectomy; and one had urethral diverticulectomy.

The reasons for failure to obtain conversion in 20 of the Group II patients were: (1) surgical care of ischemic ulcers precluded catheter withdrawal in six, (2) inadequate patient cooperation in three, (3) renal lithiasis in two, (4) chronic recurrent vesical lithiasis in one, (5) requirements of nursing care in one elderly man and two women, (6) no definitive bladder rehabilitation initiated in two, (7) transfer of one patient to another hospital for further care, and (8) two patients with catheters still under treatment in the hospital. The six patients with ischemic ulcers might have benefited from neurosurgical conversion to a flaccid state to eliminate lower extremity spasticity.

The greater frequency of successes in patients with incomplete lesions and the shorter average time they required to become catheter-free probably reflects the influence of the supraspinal centers in the control of micturition. The better results obtained in patients with autonomous bladders and in patients with lesions below the ninth thoracic vertebra may be due to several factors. Diminished spasticity in trunk musculature, greater mobility, and intact sympathetics may all have favorably influenced the results. The average length of time required by patients with autonomous bladders to become catheter-free probably could have been shortened if this type of bladder had been recognized earlier. One might expect that the length of time to become catheter-free would be shortest in autonomous bladders, since there is no need in these cases to wait for reflex activity. Early catheter removal and, if necessary, vesical neck resection can be instituted as soon as the general physical condition permits.

Drugs to modify detrusor activity were used in 32 patients. Methantheline

(Banthine) bromide, an anticholinergic and parasympathetic end plate blocker, was given to 18, and bethanechol (Urecholine) chloride, a parasympathomimetic agent, to 14. Bethanechol failed to improve emptying of the bladder in doses up to 200 mg. daily; methantheline was useful in inhibiting detrusor activity.

The value of clamping the urethral catheter and tidal irrigation as reflex conditioners is still open to question. Comarr's series⁹ revealed that these methods do not have any particular advantage over continuous drainage in establishing a catheter-free status. Clamping according to the clock may produce the unhealthy situation of a detrusor contracting against a fixed volume and may initiate an acute infection. Tidal irrigation requires close supervision in order to prevent distention and ensure complete emptying of the bladder. We prefer to use routine continuous drainage as long as catheterization is still indicated, reserving clamping of the urethral catheter and tidal drainage for special cases.

In this series the number of genitourinary complications reported is probably less than the actual frequency, since excretory urography in 6 patients and cystourethrography in 20 patients was not obtained.

Although adequate function may develop in the cord bladder, there is no guarantee that it will continue; therefore, protracted followup is essential. Renal lesions, especially calculi, may occur in spite of adequate drainage or physiological emptying of the bladder. Excretory urography and retrograde cystography should be performed at least yearly and oftener in the early stages of recovery. Roentgenograms of the abdomen and pelvis should be taken at 3- to 6-month intervals. The urine should be sterilized if possible. Important as are the first six months after injury, long-term care is equally necessary if morbidity and early death from renal disease is to be avoided.

Summary

The results on 59 patients with spinal

cord injuries treated in the University of Minnesota Rehabilitation Service in the last four years are reviewed. Sixty-four per cent of these are catheter-free. Of those admitted with catheters, 58 per cent were converted to a catheter-free status. Men did slightly better than women. Patients with autonomous bladders had a greater conversion rate (86 per cent) than did those with reflex bladders (63 per cent). Seventy-four per cent of those with incomplete lesions converted compared to 59 per cent of those with complete lesions. Patients with lesions at the 10 thoracic vertebrae and below had a conversion ratio of 83 per cent.

The average length of time after injury for the patients to become catheter-free was 7½ months. Patients with upper motor neuron lesions converted in 6 months and those with incomplete lesions in 3 months.

Ischemic ulcer was the major cause of failure to attain a catheter-free status and vesical lithiasis was the most frequent urinary tract complication (30 per cent).

The physiology of micturition with respect to the sacral spinal reflex center is reviewed, and technics of treatment are discussed. The treatment program that has evolved in the care of the cord bladder is presented.

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Addendum

Since this report was written the two patients listed (p. 472) as still under treatment have been converted to a catheter-free status.

In addition, six new patients were subsequently admitted and five of these were converted to a catheter free existence. The one patient who did not convert had worn a suprapubic tube for 15 months prior to admission. Conversion was not attempted because of the patient's age and nursing care requirements.

Adding these patients to the data of Table 2 increases the Group I total to 54 patients. The over-all conversion ratio then becomes 65 per cent. This ratio breaks down to 56 per cent for cervical lesions, 64 per cent for T1-T9 lesions and 85 per cent for T10-S5 lesions.

The average length of time after injury for these additional patients to become catheter free was 6½ months.

Use of Anticoagulants in Cerebral Thrombosis

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● The clinician is advised to use these drugs cautiously — only in certain types of cerebral vascular accidents, only if certain precautions are taken and a most rigid control maintained. Some believe that anticoagulants are of no benefit whatsoever, as described in this study; others, while recognizing the possible benefit, do not believe that the potential gain in anticoagulant therapy is worth the risk of its inherent danger. Hemorrhage is the primary danger, not only in the brain but in all parts of the body. Infarcts due to emboli are usually hemorrhagic, and anticoagulants given at such times will aggravate the hemorrhagic condition.

The major therapy in the treatment of strokes formerly consisted of vasodilator drugs in the acute stage, and in the chronic phase the rehabilitation of the patient. The use of vasodilators was based on the theory that surrounding the area of infarction there is an area of vasospasm which supposedly leads to extension of the infarcted area and further disability. Vasodilators have been found to have little effect upon the course of the stroke, however, and they are falling more and more into disuse.

Anticoagulants are a relatively new modality, dating back to the discovery of Dicumarol (bishydroxycoumarin) in 1941. They have become increasingly popular among clinicians, and to a large extent have replaced the vasodilating drugs. As with any new modality, there are many pros and cons as to their effectiveness, and varying opinions as to whether the potential danger is worth the possible gain. The overwhelming evidence from clinical studies appears to favor the use of anticoagulants in specific cases of cerebral vascular accidents. The ultimate goal is to prevent atherosclerosis and hypertension completely; but until this can be attained, emphasis must be placed upon treatment rather than prevention.

Presented here is a discussion of the anticoagulant drugs based on clinical case studies; their effectiveness in various types of strokes, their dangers, the precautions that must be taken in their use, the optimum dosages and routes of administration, and recommendations for their use. This is based on the most

recent studies of the subject, appearing in the literature from 1956 through 1958.

Anticoagulant Therapy

The objectives of anticoagulant therapy are: (1) to prevent the first stroke, (2) to prevent extension of the thrombus once a stroke has taken place, and (3) to prevent multiple strokes. Their use is primarily in cerebral thrombosis. Thrombosis is usually due to atherosclerotic narrowing of vessels with subsequent clot formation. The stroke itself is often preceded by transient ischemic attacks, and if anticoagulant therapy is started at this early stage, thrombosis is thought to be prevented. Later in the course of the disease, however, as the atherosclerotic narrowing of the vessels increases, anticoagulants can no longer have an effect; but it is thought that a stroke can be delayed for many years. After thrombosis has taken place, anticoagulant therapy will prevent further deposition of clot, thus keeping the area of infarction to a minimum. Anticoagulant use for long-term therapy will delay any further stroke for years.

Anticoagulants for Strokes

In February, 1958, Millikin, Siekert, and Whisnant¹ reported a series of clinical case studies on four specific types of strokes in which they found anticoagulant therapy to be most useful.

In these cases anticoagulants were given as follows: Heparin, 50 mg. every four hours was used when a rapid anticoagulant action was desired, and bishydroxycoumarin was given for long-term therapy, the dosage varied to keep the prothrombin time 35 to 40 seconds, or about twice the normal value.

This contribution received the 1958 Bernard M. Baruch Essay Award sponsored by the American Congress of Physical Medicine and Rehabilitation. Fourth year medical student, New York Medical College; now, Community Hospital of Glen Cove, N. Y.

Type I. Intermittent Insufficiency in The Vertebral-Basilar System. These patients have episodic attacks lasting 5 to 15 minutes, in which certain neurologic signs appear, such as diplopia, slurring of speech, hemiplegia, and unconsciousness. These signs usually appear first on one side, and then on the other. The patient usually recovers completely; but after many such attacks, a permanent neurologic defect may develop.

In this group 94 patients were treated with anticoagulants. In 90, attacks stopped completely. In the other four cases, the attacks became less frequent and less severe. In no case was there progression to thrombosis and infarction.

Type II. Infarction in the Vertebral-Basilar System. The attack starts in the slight to severe defects, and the damage becomes permanent. For example, diplopia may progress to blindness, or weakness may progress to dysarthria, dysphagia, or hemiplegia.

A total of 107 patients of this type were treated with anticoagulants; nine patients died, a mortality rate of 8 per cent. In a control series of 31 similar patients who were untreated, 18 died, a mortality rate of 58 per cent.

Type III. Intermittent Insufficiency of the Internal Carotid System. This manifests itself in transient attacks which usually consist of a unilateral paralysis, weakness, anesthesia, or paresis. After many such attacks, a permanent neurologic defect is usually established.

Of 85 cases of this type treated with anticoagulants, the attacks stopped completely in 82; in two, attacks continued, but were less frequent and less severe; in one, there was a progression to infarction.

Type IV. Occlusion of the Carotid System. This is preceded by transient signs, but as occlusion progresses, the signs persist and advance, and there is a permanent damage. In 31 patients of this type treated with anticoagulants, there was no further progression of the neurologic defect in 29 after therapy was instituted. In two patients, progression to hemiplegia occurred. In a control series of 17 patients, hemiplegia

developed in five, and one died. Thus, hemiplegia developed in 35 per cent of untreated patients, in contrast to 6 per cent of treated patients.

On the basis of the results obtained in this clinical study, Millikan, Siekart, and Whisnant¹ recommend that anticoagulant therapy be used in these four types of cerebral vascular accidents. They do not advise routine usage of the drugs in all cases of these types, however. For patients with intermittent arterial insufficiency, the decision as to whether anticoagulants are to be given depends upon the frequency and severity of the attacks. If there has been a single attack with complete recovery, or if attacks are mild and infrequent, therapy is withheld. If the attacks are increasing in frequency and severity, or if a permanent defect is present, anticoagulants are used. For advancing carotid occlusion, they advise immediate treatment with intravenous heparin. After a certain period, the drugs are withdrawn, and the patient is observed for any further progression of the defect; if none is observed, treatment is stopped. With vertebral-basilar system occlusion, anticoagulants are not withdrawn, as the mortality rate is high in this type. Also, progression of the defect may occur suddenly after a period of no progression, so that it is difficult to judge when thrombosis is complete.

Anticoagulants for Cerebrovascular Accidents

McDevitt and co-workers² reported a series of clinical studies on different types of cerebral vascular accidents. In this series 51 patients had rheumatic fever with cerebral embolization and infarction; 28 patients had arteriosclerosis and hypertension and had had previous infarction; 10 patients had recurrent focal cerebral ischemia, and 11 patients had cerebral occlusion due to a variety of causes, such as polycythemia vera and Cooley's anemia. These patients were treated with anticoagulants, and a control group of similar patients was left untreated and was observed. In the treated patients, for a total of 2,291 patient-months, there were 72 thrombo-

embolic episodes, 16 of which were cerebral, as contrasted with the control group, in which for a total of 2,842 patient-months there were 229 thromboembolic episodes, 67 of which were cerebral. In the treated patients, 20 of the thromboembolic episodes occurred when the last prothrombin time had been less than 20 seconds. In treated patients with recurrent cerebral ischemia, for a total of 241 patient-months, there were 15 ischemic episodes and no cases of thrombosis, whereas with treated patients for a total of 106 patient-months, 24 ischemic episodes occurred and two cases of thrombosis. However, in the patients treated with anticoagulants, there were 51 incidences of hemorrhagic complications, 11 of which were major. Five of these were cerebral hemorrhages, of which three were fatal.

This study dramatically shows the effectiveness of anticoagulants. The number of thromboembolic episodes in the untreated patients was nearly four times that of the treated group, and the number of cerebral occlusions was over four times that of the treated group. Also, the number of ischemic episodes in the untreated group was nearly four times that of the treated group, and in the latter there were no cases of progression to thrombosis.

Ushiro and Schaller³ reported a series of clinical studies in which they did not share the enthusiasm for anticoagulant therapy. They took for study consecutive patients admitted into their clinic with cerebral vascular accidents, excluding those with cerebral hemorrhage by the presence of blood in the spinal fluid. The patients who were admitted within 48 hours of the onset of the cerebrovascular accident were treated with anticoagulants. Heparin (50 mg. every four hours) was given for initial therapy, and Demerol (meperidine, 200-300 mg. postoperatively) was given for long-term therapy, the dosage regulated to keep the prothrombin time at twice the normal value. The study was continued for 18 months using a control group of similar composition. The treated group consisted of 24 patients, whose average age was 64 years; 61 per

cent of these had a well-established history of hypertensive cardiovascular disease, and 12 per cent had had at least one previous cerebral infarction. The control group was very similar, consisting of 39 patients, average age 64½ years, of which 64 per cent had well-established hypertensive cardiovascular disease, and 44 per cent had had previous strokes. The two groups were compared as to the number of deaths, and in those who survived, the status of the patient on discharge. The results were as follows:

	Treated	Untreated
Deaths	6 (20%)	6 (16%)
Discharge status		
Ambulant	14 (54%)	25 (64%)
Wheelchair	6 (23%)	8 (21%)

Autopsies performed in four of the six treated patients showed cerebral thrombi as well as thrombi in other regions. There were similar findings in the untreated patients. Hemorrhagic complications occurred in two of the treated patients in which the prothrombin time has been maintained at twice the normal value.

Ushiro and Schaller concluded that there is "no appreciable difference in mortality rate, incidence of complications or natural course of recovery" between patients treated with anticoagulants and those untreated. Furthermore, on the basis of the findings of recent thrombi in autopsies on treated patients, they state that this "suggests that prolongation of the clotting time is in itself insufficient to prevent intravascular blood clotting." They believe that anticoagulant therapy should not be used on an outpatient basis, because of the difficulty in keeping the prothrombin time stable without daily determinations. Due to the lability of the prothrombin level, the danger of hemorrhagic complications is too great, and treatment should only be given under careful hospital control.³

Anticoagulants for Transient Ischemic Attacks

Fisher,⁴ found anticoagulant therapy very effective in the treatment of transient ischemic attacks. In 28 of 29 patients studied, the attacks stopped

completely. In the other patient, there was an attack three years after institution of therapy. He interrupted therapy on these patients and found that attacks immediately recurred, but ceased again upon readministration of the drugs. He feels that there is no doubt that anticoagulants are effective in transient ischemic attacks. Fourteen patients who were having a stroke and were on a progressive downward course were placed on therapy, and in 7 of these there was a dramatic improvement, resulting in a complete reversal of the downward course, and an almost complete disappearance of symptoms. In 3 patients a severe paralysis developed, but none of these had been given anticoagulants promptly, and the dosage had been too small. He also studied the effects of anticoagulants on a fully developed stroke, but here found the results to be no different than if no treatment had been given.

Fisher summarizes by stating that "the reports to date suggest that anticoagulants prevent ischemic attacks, postpone pending stroke and arrest the progressive downhill course of patients with cerebral thrombosis. However, since data pertaining to the natural course of this syndrome are totally lacking at present, a reliable conclusion concerning the efficacy of anticoagulants cannot be formulated."⁴

Discussion

The reports from clinical studies are for the most part favorable. The clinician is advised to use these drugs cautiously — only in certain types of cerebral vascular accidents, only if certain precautions are taken and a most rigid control maintained. Some believe that anticoagulants are of no benefit whatsoever, as previously described; others, while recognizing the possible benefit, do not believe that the potential gain in anticoagulant therapy is worth the risk of its inherent danger. The primary danger is that of hemorrhage, not only in the brain, but in all parts of the body. A recent article warns against using anticoagulants in cerebral

embolism, as here hemorrhage is likely to be produced.⁵

Infarcts due to emboli are usually hemorrhagic, which is due to an intermittent occlusion of an artery by a migratory embolus. Anticoagulants given in such a case will aggravate the hemorrhagic condition. This was seen previously by the high incidence of hemorrhagic complications in the study of McDewitt and co-workers² on anticoagulants in various thromboembolic diseases. Although infarcts as a result of thrombi are of the anemic type, and hemorrhage is not likely to be produced in them, yet Sibley, Morledge, and Lapham⁵ feel that a danger still lies in the fact that many diagnosed cases of thrombosis are actually embolism, and anticoagulant therapy may be extremely dangerous.

Anticoagulants at present seem to be indicated for the treatment of transient ischemic attacks, for a stroke in evolution, or on a long-term basis, for the prevention of further strokes. They are not indicated when a stroke is complete, although there is some evidence that anticoagulants may prevent further extension of a thrombus, and may later promote recanalization of the thrombus. Anticoagulant therapy must be applied on an individual basis, in each case weighing the possible gain against the risk involved.

An absolute contraindication is hemorrhage anywhere in the body, especially cerebral. Most clinicians do not believe that the danger of hemorrhage is any greater in embolism, and actually feel that anticoagulants are beneficial in this case. Most believe long-term anticoagulant therapy is indicated for recurrent embolization.

The prothrombin time must be carefully controlled. Some are of the opinion that this is impossible on an outpatient basis, as daily determinations should be done, while others believe that a weekly determination is sufficient. There must be a laboratory which is equipped to do prothrombin and clotting times, the physician must be alert to possible complications, and the patient must be cooperative.

Heparin in a dosage of 50 mg. every three or four hours is given in the acute case, because of its more rapid action. Depo-heparin is not used, as it seems to be more difficult to control the clotting time when this drug is used. At the same time, the longer acting drugs are started. On the first day, 300 mg. of bishydroxycoumarin are given; 200 mg. on the second day; 100 mg. on the third day, and thereafter a maintenance dose of 25-75 mg. daily, depending on the prothrombin time. The prothrombin time is maintained at twice the normal value. Determinations are made daily for the first two weeks while the patient is being stabilized in the hospital, then once a week on an outpatient basis. The patient should be instructed to watch out for and report any hemorrhagic complications, such as epistaxis, petechiae, or melena. There are no rules as to the length of therapy. Fisher feels that therapy should be interrupted after 6 months, to be restarted only if needed.⁴

Many clinicians are fearful of a rebound phenomenon during withdrawal, resulting in a catastrophic reappearance of symptoms. Fisher feels that if the withdrawal is gradual symptoms, if they do reappear, do so in a mild form.⁴

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Crutches for a Patient with Severe Upper Extremity Impairment

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● Use of the crutches described in this study may enable an individual to start gait training at an early phase of rehabilitation. The crutches were designed for a four-point gait but have proved substantial enough for a swing-through gait. It is thought that this type of crutch may readily be adapted to other patients with severe disability of one or both upper extremities.

Recently it became necessary to design a special crutch for a patient who has had a cervical cord injury with resulting severe physical impairment of the shoulder girdles, upper extremities and trunk bilaterally, and lesser impairment of the lower extremities. The crutches solved the following problems of ambulation:

1. Nonfunctional triceps bilaterally.
2. Nonfunctional grip bilaterally.
3. Flexion contracture of 140 degrees at right elbow.
4. Extreme internal rotation of the forearms (a factor which precluded the use of conventional axillary crutches with triceps straps and anterior horn).
5. Strong legs and good walking pattern but poor balance because of spasticity.
6. Extreme pressure at the axillae with conventional crutches.

The crutches were constructed from conventional axillary crutches in an offset design which placed the arm centrally between the uprights. The posterior upright of a conventional crutch was removed and a piece of $\frac{3}{8}$ -x-1-inch aluminum strap shaped to accommodate the flexion contracture of the right elbow was substituted. This was padded along the entire area of contact with the arm. The original axillary piece was removed and replaced by a circle of aluminum strap completely covered by elastic molding material formed to the contour of the patient's arm at a point 2 inches below the axilla. The anterior portion of this ring was widened and inclined forward 20 degrees

in order to insure an even distribution of pressure. The entire area was covered by foam rubber overlaid by doeskin. The resulting ring centralized the pressure of weight bearing in the anterior deltoid region.

The forearm was stabilized by two semicircular bands of padded aluminum strap attached to the posterior aluminum upright at the level of the upper forearm and the wrist. The upper forearm band prevented lateral displacement of the arm and the lower band with the retaining strap prevented anterior displacement. One half of a hollow rubber ball, five inches in diameter, was placed at the anterior end of the handpiece as a foil to further stabilize the hand (see figs. 1 and 2).

The presence of the encircling deltoid ring at the top, plus the straps at the wrist, made it impossible for this patient to clear the crutches while falling, but since he could do little to cushion a forward fall, this was thought permissible. He was given extensive training in a method of falling by bending his knees and twisting to land on his buttocks. Even with slight forward overbalance, he could twist to the side of the balance disturbance well enough to avoid becoming entangled with the crutches. Using the crutches, he became able to get into and out of chairs unassisted and to ascend and descend stairs with assistance.

The greatest value of the crutches is their elimination of pressure at the axillae. Weight is distributed instead to the anterior deltoid area, forearm, and

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palmar surface of the hand, thus eliminating the danger of a brachial plexus palsy, and at the same time placing the arm in a position of natural function. The design of the crutches compensates for forearm rotation and for poor grasp ability. This patient has not complained

of pressure, nor has he suffered restriction of circulation to the hands or forearms.

Use of these crutches may enable an individual to start gait training at an early phase of rehabilitation. The crutches were designed for a four-point

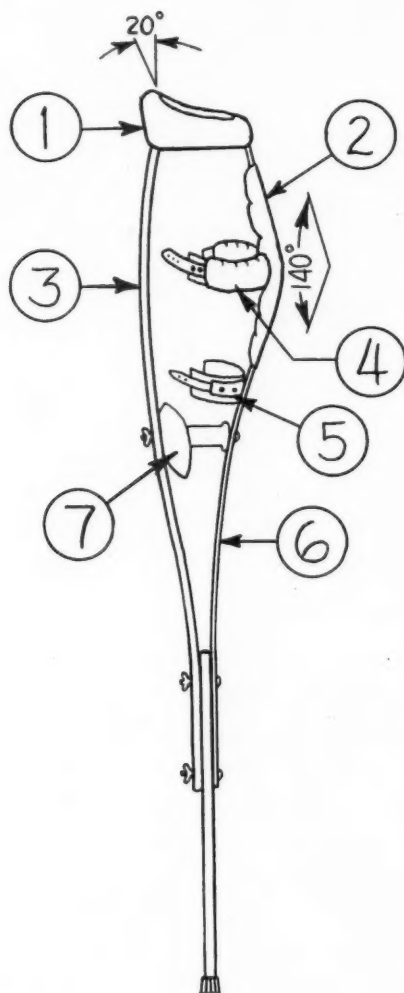


Fig. 1 — 4-inch diameter aluminum strap circle covered with celastic, sponge rubber, and leather; (2) sponge rubber padding covered with doeskin; (3) wooden upright from conventional axillary crutch; (4) semicircular padded aluminum strap with leather retaining strap; (5) semicircular aluminum strap with leather retaining strap for the wrist; (6) $\frac{3}{8}$ x 1-inch aluminum strap upright; (7) rubber hand foil: One-half hollow rubber ball, 5-inch diameter, fixed at center to handpiece of crutch.



Fig. 2 — Crutches in use.

gait but have proved substantial enough for a swing-through gait. The total cost of material used was approximately \$15.00.

From observation, it is thought that this crutch may readily be adapted to other patients with severe disability of one or both upper extremities.

Acknowledgment: The authors are indebted to Mr. John Gerike who prepared the diagram of the crutch.

Important Announcement —

The next examinations, written and oral, of the American Board of Physical Medicine and Rehabilitation will be held in New York City, June 17 and 18, 1960. The final date for filing application is February 15, 1960. Write to the Secretary, Dr. Earl C. Elkins, 200 First Street S. W., Rochester, Minnesota, for application.

Ultrasonic Effects as Demonstrated in Live Pigs with Surgical Metallic Implants

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and
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● Maximal therapeutic dose of ultrasonic energy was applied over the areas of surgical metallic implants in live pigs comparable in weight to human beings. Temperature levels measured in the focal area of ultrasonic intensity resulting from reflection at the metal implant surface were within the range generally considered to be therapeutic. Histologic studies demonstrated that ultrasound applied in the presence of a surgical metallic implant did not produce any untoward effects; specifically, there was no evidence of burns, delayed bone and soft tissue healing, or non-thermal reactions, such as cavitation. These results, obtained in live animals with the blood flow intact, demonstrate that it is possible to apply ultrasonic energy safely in the presence of surgical metallic implants. The therapeutic efficacy of ultrasonic energy in the treatment of joint contractures associated with conditions frequently managed with the insertion of metallic implants remains to be evaluated.

Previous investigations have demonstrated that there is a marked difference between the acoustic impedance of metals used in surgical metallic implants and the impedance of soft and bony tissues.¹ Therefore, reflection occurs at the tissue-metal interface. Depending on the shape of the metal implant, this reflection may result in focusing or produce patterns of standing waves. However, the increase in ultrasonic intensity does not lead to a selective rise of temperature in the focal areas or in the standing waves, since the presence of the metal implant, with a thermal conductivity higher than that of the tissue, produces a markedly increased heat loss.

The results of these investigations are in agreement with the recent observation of Gersten,² who inserted metal plates into soft tissues and found no selective rise of temperature in front of the metal.

Previous investigations indicate that it might be possible to use ultrasonic diathermy to combat joint contractures which frequently accompany conditions treated with the insertion of metal joint prostheses or other implants.³ Before such application could be considered for human beings, the results demonstrated in specimens had to be confirmed in live animals. Specifically, it was necessary

to prove that the temperature in the focal areas or in the standing waves in front of the implant did not exceed therapeutic levels during the application of ultrasound. It was also necessary to demonstrate that the intensity levels obtained as a result of reflection of ultrasonic energy would not produce destructive effects, such as a delay of bone repair or the occurrence of cavitation.⁴⁻¹¹

Methods

Because of its size and tissue structure, the adult pig was the animal of choice for these experiments. The weights of the pigs used varied from 100 to 180 pounds. Only metal implants which produce a marked increase in ultrasonic intensity by reflection were used.¹ The following surgical procedures were used:

The pigs were not fed for 48 hours before operation. An initial dose of 1.2 gm. of pentobarbital sodium and 1/75 grain (0.8 mg.) of atropine sulfate was administered rapidly into an ear vein. Additional anesthetic agent was then carefully added through the same needle until the eyelid reflexes were barely perceptible. An endotracheal tube was then inserted, and the animal was placed on a Plummer respirator which contained an ether vaporizer for prolonging the anesthesia when necessary.

The operative site was shaved and draped, using ordinary aseptic surgical technics. For attachment of bone plates onto the ribs, the approach was through a transverse incision directly over the

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desired rib. Standard methods were used in exposing the rib and attaching the plate. For the insertion of the Smith-Peterson and the Küntscher intramedullary nails a longitudinal incision was made over the femur and down to the greater trochanter by splitting the fibers of the gluteal and lateral thigh muscles. The greater trochanter was transected, exposing the cancellous bone at the base of the femoral neck. A pilot hole ($\frac{3}{8}$ inch for the Smith-Peterson nail and $\frac{1}{2}$ inch for the Küntscher nail) was driven through the cancellous bone into the medullary canal of the femoral shaft. The metal implant was then inserted. The greater trochanter was reattached using silk sutures in the periosteum. The fascia, subcutaneous tissue, and skin were closed with similar material. When thermistor needles were inserted in the implant, the wires were passed out through separate stab incisions in the muscle and skin. The ends of the wires were buried in the subcutaneous tissue under the stab wound and could be retrieved merely by grasping them with a thumb forcep.

In the first series of experiments, a thermistor needle was inserted into each pig along with the metal implant in such a fashion that the thermistor bead could be located in the areas where a focus or standing waves would be produced during the period of ultrasonic treatment. Küntscher and Smith-Peterson nails were placed into the femurs; bone plates were attached to the ribs. Three to five days after surgery, the unanesthetized pig was placed in a box, and a small incision was made to expose the wires leading to the thermistor probe. These wires were attached to the temperature recording device (Visicorder, Model No. 906). Then ultrasound of an intensity of 2 W./cm.² was applied, using a stroking technic. The radiating surface of the applicator was 12.5 cm. The ultrasonic frequency was 1 megacycle (courtesy of the Dallons Corporation, Model No. 2A). This application of ultrasound represented the maximal dose tolerated by the pigs without exhibiting signs of pain. The temperatures obtained during the treatment were recorded.

In the second and third series of experiments, Smith-Peterson nails, as well as Küntscher nails, were inserted bilaterally into the femurs of pigs. In the fourth series, bone plates were attached bilaterally onto corresponding ribs. On the tenth to eighteenth day after surgery, ultrasound therapy of an intensity of 1 to 3 W./cm.² was applied to one side with the technic as described previously, with the other side serving as control. Daily treatments were given for 5 to 7 consecutive days; animals were sacrificed 2 to 3 days after the last treatment. Careful gross and histologic examinations of the control and of all tissues traversed by the ultrasonic beam were made.

Experimental Results

In the first series of experiments, the temperatures obtained in the focal areas of ultrasonic intensity were recorded during application of the maximal tolerated dose. In these experiments the sound beam was incident perpendicular to the bone plate, to the groove of the Küntscher nail, and to the angle formed by the flanges of the Smith-Peterson nail.

The results of all temperature studies are summarized in table 1. All temperatures obtained were within the range considered to be of therapeutic value.^{12,13} In 8 of 22 experiments the temperature in front of the bone plate returned to normal body temperature within 15 minutes. In the remaining 14 experiments the temperature remained elevated at 0.3 to 1.3°C. for more than 20 minutes. In all experiments with the Küntscher and Smith-Peterson nails the temperature returned to normal within 15 minutes.

Figures 1, 2, and 3 show typical examples of temperature curves obtained in front of a metal plate, inside the groove of a Küntscher nail, and between flanges of a Smith-Peterson nail. In all instances the maximal tolerated ultrasonic dose was applied. The little spikes visible in all temperature curves represent the strokes of the transducer over the area of the thermistor. In all experiments with the Küntscher nail the

Table 1: Temperature Rise in Area of Maximal Intensity Close to Metallic Implant During 5-Minute Exposure to Ultrasound.

Implant	No. of Exposures	Temperature Before Treatment Mean Value	Standard Deviation of Mean	Maximal Temperature During Treatment Mean Value	Standard Deviation of Mean
Bone plate	22	39.8C.	± 0.61	42.8C.	± 0.47
Kuntscher nail	9	39.7C.	± 0.60	42.8C.	± 0.63
Smith-Peterson nail	9	39.9C.	± 0.34	43.8C.	± 0.38

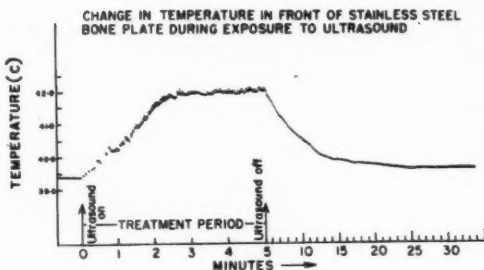


Fig. 1

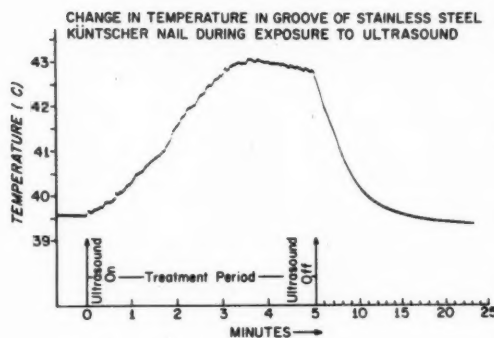


Fig. 2

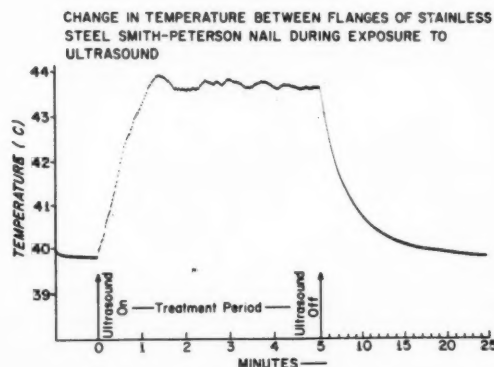


Fig. 3

pigs briefly exhibited signs of pain at the maximum temperature peak shown on the curve. In spite of the continuous application of this same dose, the temperature curve dropped consistently, and the signs of discomfort disappeared. It is conceivable that this decline may be due to an increase of blood flow, resulting in greater heat losses by convection.

The temperature between the flanges of the Smith-Peterson nail rose rapidly to a peak at which the pig exhibited marked signs of discomfort. The length of the stroking movements of the sound applicator was increased in such a fashion that the temperature was kept below the peak at which pain occurred.¹⁴

In the second series of seven experiments, identical metal implants were used. In three pigs, bone plates were attached bilaterally to the ribs in corresponding sites. Smith-Peterson nails were inserted bilaterally into the femoral shafts of two pigs, and Kuntscher nails were inserted bilaterally into the femoral shafts of two other pigs. As previously described, one side was treated while the other side served as control. Careful gross and histologic examinations did not reveal any difference between the treated and untreated sides. In particular, there was no indication of any burns on the treated side. There were no focal lesions with petechial hemorrhages that are characteristic of the occurrence of cavitation.^{7,15} The newly formed bone around the metal implant on the treated side was identical in amount and appearance with the bone on the untreated side (figs. 4 and 5). There was no delay in healing of the soft tissues on the treated side (fig. 6).

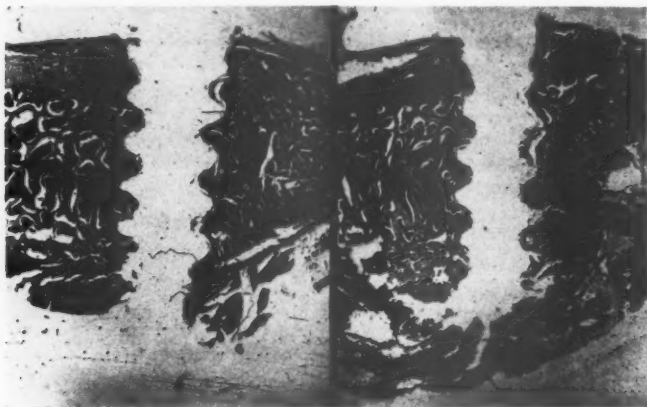


Fig. 4— Bone repair around metal screw implanted into rib. Screw removed for preparation of histologic slide. Left, control; right, treated.

Summary

A maximal therapeutic dose of ultrasonic energy was applied over the areas of surgical metallic implants in live pigs comparable in weight to human beings. Temperature levels measured in the focal

area of ultrasonic intensity resulting from reflection at the metal implant surface were within the range generally considered to be therapeutic. Histologic studies demonstrated that ultrasound applied in the presence of a surgical metallic implant did not produce any

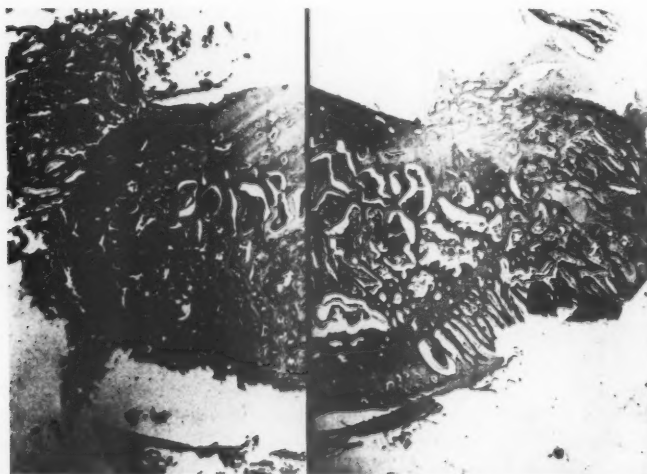


Fig. 5— Outer edges of picture show new bone growth occurring at edges of implanted bone plate. Plate removed from portion of specimen shown at top midline of photo. Left, control; right, treated.

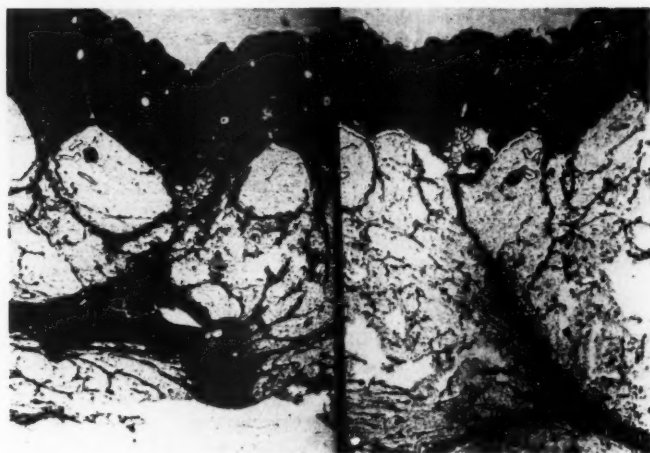


Fig. 6 — Surgical scar through skin and subcutaneous fat over implanted metal bone plate. Left, control; right treated.

untoward effects; specifically, there was no evidence of burns, delayed bone and soft tissue healing, or nonthermal reactions, such as cavitation. These results, obtained in live animals with the blood flow intact, demonstrate that it is possible to apply ultrasonic energy safely in the presence of surgical metallic implants. The therapeutic efficacy of ultrasonic energy in the treatment of joint contractures associated with conditions frequently managed with the insertion of metallic implants remains to be evaluated.

Acknowledgment: The authors are indebted to Mr. Vilus Johnston, Miss Carlo Crim, and Mr. Gary Grant for their technical assistance.

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So they say . . .

It makes little difference how magnificent are our new buildings or how impressive are our private kingdoms. If no answer is found to war, all men will die poor.

— NORMAN COUSINS

The fine art of executive decision consists in not deciding questions that are not now pertinent, in not deciding prematurely, in not making decisions that cannot be made effective, and in not making decisions that others should make. — CHESTER I. BARNARD

By despising himself too much a man comes to be worthy of his own contempt. — FREDERIC AMIEL

There are hardly two creatures of a more different species than the same man, when he is pretending to a place, and when he is in possession of it. — LORD HALIFAX

Electrocardiographic Changes in Poliomyelitis Patients

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and

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● Electrocardiographic examinations were made on a series of 70 severely involved anterior poliomyelitis patients. All except four of the patients were adults and the examinations were made four to twelve months after the onset of poliomyelitis. None of the patients had a previous history of rheumatic fever or other cardiac disease prior to poliomyelitis. Six or seven per cent of the severely involved poliomyelitis patients showed persistent abnormalities of the electrocardiogram, which were regarded as permanent changes. The alterations of the electrocardiogram occurred in the S-T segment and T wave abnormalities.

Pathological changes in the myocardium of poliomyelitis patients have been reported by Saphir and Wilde.¹ These consisted of focal perivascular and diffuse interstitial cellular invasion of the heart muscles observed in six of seven fatal cases. Similar findings were reported in five of seven cases of fatal poliomyelitis by Peale and Lucchesi.² Electromyographic changes in acute poliomyelitis patients have been reported by Gefter and associates,³ who observed abnormalities of the electrocardiograms in 14.2 per cent of the anterior poliomyelitis patients examined in the acute stage. There appeared to be some correlation between the frequency of the abnormalities and the severity of the disease. The significant changes which were noted were those of high P waves, prolongation of the P-R interval, slurring of the Q-R-S complex, abnormal S-T segments, abnormal T waves, and, in a few instances, left axis and right axis deviation.

Bradford and Anderson⁴ reported electrocardiographic changes of patients with anterior poliomyelitis during the epidemic in Colorado. They noted significant changes in 12 per cent of the patients. However, the electrocardiograms were observed to return to normal within a period of two months.

Manning and Yu⁵ studied serial electrocardiograms of 150 poliomyelitis patients and all but 34 (77.3 per cent and 22.7 per cent respectively) showed abnormal changes during the acute and early convalescent stage of the illness.

Here, again, the majority of electrocardiograms returned to normal by the end of the first month and only a few showed abnormalities three months after the onset. They obtained electrocardiograms within 24 hours after admission and repeated them at 2- to 4-day intervals. Of the 150 patients studied, only 9 adults and 25 children showed completely normal tracings throughout the study. Other reports, published by Gustafson and Magules,⁶ Louis Weinstein and Shelokov,⁷ and L. M. Rose⁸ showed similar electrocardiographic findings.

The present study reports observations on a series of 70 patients with anterior poliomyelitis who were severely paralyzed with either the spinal paralytic or the bulbospinal paralytic type. Four of the patients had severe respiratory paralysis and required the use of the respirator for a period of 5 to 15 months. Six of the 70 cases showed definite abnormal electrocardiographic changes indicating myocardial involvement, and these changes persisted for a period of 7 to 12 months following the onset of poliomyelitis. None of the patients gave any history of rheumatic fever or heart disease prior to the onset of poliomyelitis. Only 4 of the 70 patients of this series were children; the ages of the adults ranged from 25 to 45. A résumé of the significant clinical data and electrocardiographic findings of the 6 patients with electrocardiographic abnormalities are shown in table 1.

The pertinent abnormalities noted in the records are listed as follows: Depression of S-T segment in Lead 3, low T wave in Lead 1 and all V Leads,

Read at the Thirty-sixth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Philadelphia, August 26, 1958.

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Table 1

Patient	Onset of Poliomyelitis	Involvement	Initial Electrocardiogram	Final Electrocardiogram
27-year-old woman	Sept. 9, 1951	Respiratory paralysis Quadriplegia	April 14, 1952 — 7 months after onset. Depression of S-T segment in Lead III, Low T in Lead I and all V Leads, isoelectric T in II, inverted T in Lead III	Not repeated
29-year-old woman	Oct. 20, 1951	Quadriplegia Respirator for 5 months	May 15, 1952 — 7 months after onset. Flat T. T2 and T3 isoelectric	Repeated 9 months later No Change
29-year-old woman	Oct. 23, 1951	Quadriplegia Respirator 4½ months	May 15, 1952 Flat T waves in all Leads Abnormal S-T segment in Lead III.	Repeated 9 months later No Change
42-year-old woman	Aug. 15, 1951	Quadriplegia Respirator 7 months Tracheotomy	June 8, 1952 — 10 months later Inverted T waves in Leads I, II, III — V4, V5, V6	Repeated EKG 9 months later showed essentially the same changes except slight elevation of T wave in Lead III
32-year-old woman	Sept. 22, 1950	Quadriplegia Not in respirator	July 15, 1952 — 22 months after onset. Abnormal T waves in all Leads	Repeated EKG 8 months later showed no changes
23-year-old man	Aug. 16, 1952	Quadriplegia Not in respirator	Dec. 12, 1952 — 4 months after onset. Slight changes in Q-R-S in Leads III and V2	Repeated EKG 2 months later — normal

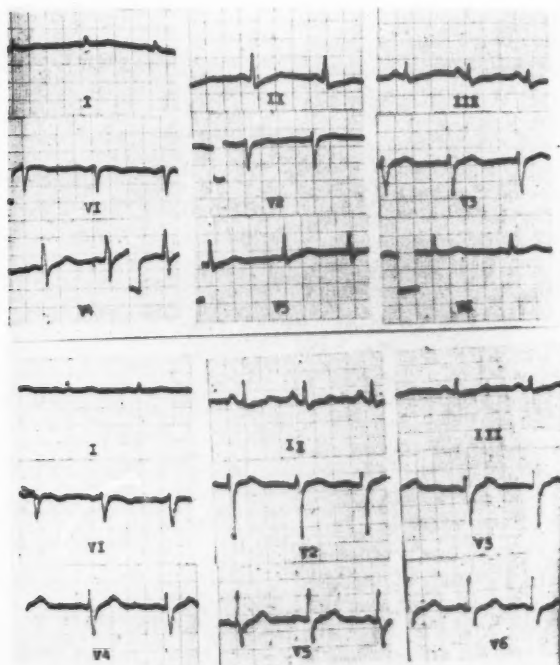


Fig. 1 — Top set seven months after poliomyelitis; lower set sixteen months after poliomyelitis.

isoelectric S-T segments, inverted T waves in Lead 3, flat or isoelectric T waves in Leads 1, 2, and 3, abnormal S-T segments in Lead 2, inverted T waves in all six Leads, abnormalities of T waves in all Leads, changes in Q-R-S segment in L3 and D2. Some of the typical electrocardiographic changes observed in these patients are illustrated in figure 1.

Repeated electrocardiograms showed essentially the same abnormalities in all six cases except one in which the findings returned to normal after four months. The abnormalities are regarded as possibly permanent in nature. This interpretation, however, is to be checked on most of these patients after an interval of more than five years.

Conclusions

Seven per cent of a series of 70 severely involved anterior poliomyelitis patients showed persistent electrocardiographic changes 4 to 12 months after the onset of poliomyelitis. The most common abnormalities noted were found in the T waves, low isoelectric or inverted

in 2 to 6 Leads, depression or abnormal S-T segments, and abnormalities of the Q-R-S complex.

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"Pulse of a Nation"

portrait of washington, d. c. ii

Located on the northeast bank of the Potomac River between the States of Maryland and Virginia is the capital city of the United States, Washington, D. C. This site was selected by George Washington and planned by Pierre Charles L'Enfant.

Washington has been the seat of our National government since 1800. The site for the city was selected through the efforts of Thomas Jefferson. In the early days, the city centered around Lafayette Square, reaching east to the Capitol and west to old Georgetown. Colonial architecture predominates in this exclusive residential area as well as in the nearby State of Virginia.

Today, the capital city reflects various styles of architectural design, although most of it conforms to the classical Greek and Roman periods. Its imposing buildings are seldom over five or six stories in height. Hundreds of monuments and memorials honor the heroes and statesmen of America. With few exceptions most of the great landmarks are only a short distance apart.



United States Capitol

The United States Capitol is located on Capitol Hill. President George Washington laid the cornerstone in 1793, and seven years later the U. S. Congress met here for the first time. Dr. William Thornton was responsible for the early construction which included only the central portion of the building. The House extension was completed in 1857 and the Senate in 1859. During the Civil War, the dome was completed. At this time Thomas Crawford's famous statue "Freedom" was raised into place. The House and Senate Chambers, Statuary Hall, the Rotunda, and the President's Room are of great interest. The Rotunda and Statuary Hall contain art works immortalizing American history and the Americans who were part of it. Here also are the original chambers of the United States Supreme Court. A subway car system connects the Senate Office Building with the Capitol and an underground passageway links it with the Old House Office Building. However, like the New House Office Building, they are all within walking distance. The equestrian statue of General Ulysses S. Grant, near the Mall approach is the second largest in the world. At night, multicolored lights play on a large fountain linking the Union Station Railroad Terminal with the Capitol. The huge illuminated Dome of the Capitol is a beautiful spectacle which can be seen from many parts of the city.

The United States Supreme Court is located near the Capitol. This inspiring beautiful structure is of white marble in classic Corinthian design by Cass Filbert. The sculpture in the Pediment is by Robert Aitken. The seated figures flanking the long entrance to the building

are by James E. Fraser and symbolize the courts and solons of other ages. A large Memorial Hall leads the way to the Supreme Court Chamber; this most impressive room is where historical cases are heard and decisions handed down. The sessions which are open to the public begin at noon and last until 4:30 p.m. The seating capacity is limited to 144 persons. The building also contains private chambers for the nine justices and their administrative staffs.



National Gallery of Art

The National Gallery of Art, is one of our country's great cultural monuments. This imposing rose-white marble building in the neoclassic style was designed by John Russel Pope. The gift of Andrew W. Mellon, it was opened to the public in 1941. It is the showcase of priceless treasures, including over 20,000 works of art that include paintings, sculpture, prints, drawings, and items of decorative art. The paintings and sculpture comprising the Mellon, Kress, Widener, and Dale Collections, with gifts from other donors, are on the main floor. The walls of the Rotunda are of Rockwood stone. The two Garden Courts are of limestone and in each there is a fountain surrounded by plants and flowers. The building is air-conditioned.



Smithsonian Institution

The Smithsonian Institution is a *must* for every Washington visitor. It was founded in 1846 under the terms of the will of James Smithson, an English scientist, who bequeathed his

entire fortune to the United States of America "to found at Washington under the name of the Smithsonian Institution an establishment for the increase and diffusion of knowledge among men." This purpose is carried out chiefly by means of research, exploration, publication, and museum and art gallery exhibits. In the course of the Institution's development, ten bureaus were established which are now considered public necessities. As such are supported wholly or in part by government funds. The Institution itself is a private foundation. Funds for its support were left in trust to the United States. The Smithsonian bureaus are the United States National Museum, National Gallery of Art, National Collection of Fine Arts, Freer Gallery of Art, Bureau of American Ethnology, International Exchange Service, National Zoological Park, Astrophysical Observatory, National Air Museum, and the Canal Zone Biological Area.

Places of Interest

THE MALL AND VICINITY

THE MALL, oldest of the Federal parks, extends from the Capitol grounds to the Washington Monument grounds, between Constitution and Independence Avenues. At the eastern end of the Mall is the Grant Memorial, one of the largest pieces of statuary in the city. The bronze of General Grant is the world's second largest equestrian statue. The Victor Emanuel statue in Rome is one-half inch taller.

NATIONAL GALLERY OF ART, Constitution Avenue, lies between 4th and 7th Streets. The building, one of the finest museums in the world, and a magnificent collection of art, were gifts of Andrew W. Mellon. Included in the gallery are the Mellon, the Samuel H. Kress and the Widener collections of masterpieces from the principal schools of European painting and sculpture; the Widener collection of decorative arts; the Rosenwald collection of prints and drawings; the Dale collection of paintings, primarily of the French nineteenth and twentieth-century schools; and numerous gifts from other donors. This building has an intricate air-conditioning system to create the proper temperature for preservation of the collection. It is open daily, holidays and Sundays without charge. Viewing hours are 10 a.m. to 5 p.m. on weekdays and holidays; 2 p.m. to 10 p.m. on Sundays. Introductory tours lasting 45 minutes are available at 11 a.m. and 3 p.m. Tuesday through Saturday, Monday at 3 p.m. and Sunday at 5 p.m. A tour concentrating on special types or schools of painting is available Tuesday through Saturday at 1 p.m. and Sunday at 2:30 p.m. A 15-minute discussion of one art object is given at 12:00 noon and 2 p.m., Tuesday through Saturday; Sunday at 3:30 p.m. and 6:30 p.m. Free lectures Sunday throughout the year at 4 p.m. in the auditorium; free concerts in the East Garden Court, Sunday at 8 p.m. except during July and August. Cafeteria open, except Monday, 11 a.m. to 4 p.m., Sunday 4 p.m. to 7 p.m.

NATIONAL ARCHIVES, Constitution Avenue between 7th and 9th Streets, N.W., preserves and makes available Government records of enduring value. The Exhibition Hall, where the Declaration of Independence, the Constitution, the Bill of Rights, and other historic documents relating to the formation of the Union are on display. It is open weekdays 9 a.m. to 10 p.m.; Sunday and holidays 1 p.m. to 10 p.m.; visitors are requested to use Constitution Avenue entrance.

FEDERAL BUREAU OF INVESTIGATION is in the Department of Justice building between 9th and 10th Streets and Pennsylvania and Constitution Avenues, N.W. Tours, lasting approximately one hour, start at the center entrance on Pennsylvania Avenue between 9th and 10th Streets from 9:30 a.m. to 4 p.m., Monday through Friday, except holidays. No admission.

LINCOLN MUSEUM, 511 10th Street, N.W., is the old Ford Theater building where Lincoln was assassinated by John Wilkes Booth on April 14, 1865. The building has been remodeled twice, but the exterior is still practically as it was in 1865. The pistol with which the President was killed, Booth's diary and many other relics are exhibited. Open weekdays 9 a.m. to 9 p.m., Sunday and holidays 12:30 p.m. to 9 p.m. Admission ten cents; children under 19 are admitted without charge.

HOUSE WHERE LINCOLN DIED (Petersen House) is at 516 10th Street, N.W., across from the Lincoln Museum. To this house the President was carried on the night of his assassination, and here he died the next day. When announcing Lincoln's death from this house, Secretary of War Stanton uttered his memorable words, "Now he belongs to the ages." An attempt has been made to reproduce the atmosphere of a typical home of the 1860's. Open weekdays 9 a.m. to 5:30 p.m.; Sunday and holidays 12:30 p.m. to 5:30 p.m. Admission ten cents; children under 19 are admitted without charge.

book reviews

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation.

PRACTICAL DERMATOLOGY. Second edition. By *George M. Lewis, M.D.* Cloth. Price \$8.00. Pp. 363, with illustrations. W. B. Saunders Company, West Washington Sq., Philadelphia 5, 1959.

This excellent, concise, useful textbook in practical dermatology will be a welcome addition to the library of many physicians. As stated by the author, the book is designed as a text for medical students, a practical guide for general practitioners, and an aid in orientation for other specialists. The material is well organized, beginning with an extensive table of contents. Descriptions of lesions, points in differential diagnosis, and methods of treatment are well presented. The text is profusely illustrated with well-chosen, well-reproduced black and white illustrations. A section on the Dermatologic Formulary includes information on prescription medications as well as on many of the commercial preparations which appear under various trade names. This book is not designed to replace the larger and more detailed reference works in dermatology; they are essential to provide more complete information, especially in regard to some of the rarer and more serious diseases with skin and systemic manifestations, such as dermatomyositis, scleroderma, and lupus erythematosus. However, the book admirably achieves the primary aims of the author. (*Gordon M. Martin, M.D.*)

RIGHT-LEFT DISCRIMINATION AND FINGER LOCALIZATION: Development and Pathology. By *Arthur L. Benton, Ph.D.* Cloth. Price, \$7.00. Pp. 185. Paul B. Hoeber, Inc., Medical Book Dept. of Harper & Bros., 49 E. 33rd St., New York 16, 1959.

The author has devoted himself to the study of the genetic aspects of right-left discrimination and finger localization. This monograph reports results of these studies and reviews the literature on this most interesting subject. Dr. Benton does the medical profession a great service by stressing the importance of a type of testing that is seldom done by the average physician. He also causes one to reflect on other methods of evaluation that may be ignored in our clinical examinations. Right-left disorientation and

finger agnosia have been described as behavioral patterns in patients with cerebral disease. These disturbances, with methods of testing in mental defectives, brain damaged children and persons with reading disabilities are discussed.

This work will interest the clinician because of emphasis on the need for analysis of the "body schema". This is noted particularly in relation to Gerstmann's syndrome in which right-left disorientation is associated by Gerstmann with focal disease in the parieto-occipital region of the dominant hemisphere. (*Charles D. Shields, M.D.*)

PSYCHIATRY IN GENERAL PRACTICE. By *J. A. Weijel.* Cloth. Price, \$7.00. Pp. 208. Elsevier Press, Inc., Bank of the Southwest Bldg., Houston 2, 1959.

The last sentence in this book summarizes its general theme: "We can then approach the patient not just as a case but also as a human being." Therefore, every patient seen by the general practitioner or in a general hospital should also be evaluated in terms of his psychosocial needs. To engage a psychiatrist to examine all patients is not realistic. Furthermore, the consulting psychiatrist has a tendency to view the referred patient as if he were suffering from a mental disorder. For this reason, the author devised a Psychosocial Questionnaire—the psychosocial "stethoscope"—through which a physician will be able to perceive those signals which will help him interpret more intelligently the patient's somatic symptoms or indicate the need for a psychiatric consultation. The author, a Dutch psychiatrist, also feels that by means of this questionnaire the physician can learn a great deal about his patient without "psychically undressing" him.

In spite of the fact that much of the book is devoted to the questionnaire, the author's contribution in this work lies primarily in his discussion of the phenomena which may be related to the somatic complaint. He differentiates the "complaint" from "symptom" and raises the question "why does the patient complain?" suggesting that in our culture the only acceptable expression of stress is in the somatic field.

The book contains many novel concepts, some challenging and even provocative but invariably stimulating. The writer is critical of our escape into "psychiatry" as well as "somaticism" and complains that "art and literature make more use of psychiatry than do general practitioners; patients meet more psychiatry in the cinemas than in their doctor's surgery." The book should be required reading for all who specialize primarily in "somatic" aspects of medicine. (*Jack Meislin, M.D.*)

AN EXPERIMENT IN MENTAL PATIENT REHABILITATION. By *Henry J. Meyer*, and *Edgar F. Borgatta*. Cloth. Price, \$2.50. Pp. 114. Russell Sage Foundation, 505 Park Ave., New York 22, 1959.

Some time ago a discussion of the need for sheltered workshop facilities for psychiatric patients was authored by the reviewer and published in the journal. At that time, Altro Health and Rehabilitation Services, a venerable pioneer organization of sheltered workshops for tuberculous and cardiac patients, was in the blueprint stage of expanding its program to offer post-hospital mental patients an opportunity to bridge the gap between the hospital and the community, with the hope of diminishing the high rate of recidivism due to inadequate preparation for community living, especially in terms of vocational preparedness. This research work is an attempt to evaluate the effectiveness of such a program.

Probably the best way to summarize the results of the experiment would be to quote from the foreword by Mr. Bertram Black, Altro executive director: "... through the indications in this report of the study are positive and heartening, no such overwhelming success shines through the small figures as to gladden the administrative eye or warm the cockles of the heart of the public relations chairman of the board of directors."

The authors, a sociologist and a social psychologist, have performed well a painstaking research task in a difficult area. Other investigators would benefit from their work. The book should be of interest to everyone in the field of rehabilitation of the mentally ill. (*Jack Meislin, M.D.*)

ORTHOPEDIC NURSING PROCEDURES. By *Avice H. Kerr*, R.N. Paper. Price, \$4.75. Pp. 364, with illustrations. Springer Publishing Company, Inc., 44 E. 23rd St., New York 10, 1959.

This is a manual offering detailed instructions for general orthopedic care. It is briefed into outline form and carefully indexed so that the nurse can be quickly informed as to general body alignment for the particular pathological condition of the patient. Special equipment is described and the manner in

which it should be set up and used is explained with illustrations. The book is designed to permit the nurse to become efficient in assisting the patient and physician quickly and efficiently. It is a good reference book for anyone handling patients with fractures, spinal injuries, amputations, etc. It is well worth owning and could be of value in the nurses' stations of all hospitals. Physical therapists will appreciate it as well. (*Frances Baker, M.D.*)

PHYSIOTHERAPY IN CHEST DISEASES. By *Torsten Bruce*, M.D.; *Caroline Reuterswärd*, and *Birgit Westin*. Paper. Price, 12s.6d. Pp. 98, with illustrations. National Association for the Prevention of Tuberculosis, Tavistock House North, Tavistock Sq., London WC 1, England, 1958.

This handbook gives quick but inclusive information on the diseases of the chest particularly the lesions of tuberculosis. It emphasizes the pre- and post-operative attention any patient undergoing chest surgery requires. The first part of the book written by Bruce is devoted to medical orientation. Pleural affections and certain pulmonary diseases are described and their surgical treatment is discussed. The second part written by Reuterswärd and Westin is devoted to the details of conservative and pre-operative and post-operative treatment.

The book is a translation of the Swedish publication published under the auspices of Swedish National Association against Tuberculosis. It is well-written and clearly illustrated though apparently prepared for the instruction of physical therapists. It will also prove to be of greatest value for medical practitioners particularly those interested in the treatment of chest disease utilizing postural therapy, breathing exercises and breathing with drainage. (*H. J. Behrend, M.D.*)

RE-EDUCATION OF THE INJURED SHOULDER. By *R. Barrie Brookes*, F.C.S.P. Cloth. Price, \$3.50. Pp. 114, with illustrations. The Williams & Wilkins Company, Mount Royal & Guilford Aves., Baltimore 2, 1959.

Mr. Brookes is rehabilitation officer, Birmingham Accident Hospital. For this monograph he received the award of a fellowship from the Council of the Chartered Society of Physical Therapy.

In this monograph he includes a resumé of the anatomy of the shoulder, its functional anatomy and its specific injuries and treatment. The information regarding this subject has been supplied by such authors as Codman, Mosley, McLaughlin, De Palma, and many others. The author's particular

contribution is from the standpoint of rehabilitation. The active exercises which he uses are well-described and well-illustrated. He condemns passive exercise. It is of interest to note that he does not describe movements or exercises in which the physical therapist can be of real assistance. The relation, however, of his exercise to the kinesiology is carefully explained. This can be a valuable book for anyone who, in any way, has the responsibility of managing injuries to shoulders. (Frances Baker, M.D.)

ORTHOPAEDICS: Principles and Their Application. By Samuel L. Turek, M.D. Cloth. Price, \$22.50. Pp. 906, with 600 illustrations. J. B. Lippincott Company, E. Washington Sq., Philadelphia 5, 1959.

This comprehensive textbook of Orthopedics emphasizes the orthopedic principles employed in the evaluation and management of patients with neuromusculoskeletal disability. Thus, the first section of 54 pages is devoted to basic sciences; none of the traumatic conditions, such as fracture of the hip, which is traditionally reviewed in orthopedic texts, is covered; and surgical techniques are not described in great detail.

The book is beautifully documented with many excellent illustrations. In addition, the book has an extensive bibliography with the references listed on the same page as the subject for which they are quoted.

In this favorable framework, there were two aspects that concerned this reviewer. First, the reviewer had the impression that much of the material described was derivative and not an editorial expression of the author based on his personal experience. Secondly, it was disappointing that in a text of this scope, no reference was made to Physical Medicine and Rehabilitation in the care of any patients, including the cerebral palsied or the amputee.

In spite of these drawbacks, the book is highly recommended because of clarity of presentation, interesting format and thorough review of the literature. (J. S. T., M.D.)

CLINICAL ORTHOPAEDICS. No. 13. *The Hand* — Part 1. Edited by Anthony F. DePalma. Cloth. Price, \$7.50. Pp. 393, with illustrations. J. B. Lippincott Company, E. Washington Sq., Philadelphia 5, 1959.

The volume is composed of 393 pages and 4 sections. The first section consists of 17 chapters relating to the hand. This is, apparently, the first of two sections which will be devoted to the hand.

The first chapter in the book is a very excellent biography of Sterling Bunnell. The subsequent chapters describing various aspects of the hand are not in logical sequence. For example, Chapter 2 is entitled "Comparative

Anthropology of Man's Hand" and then the next chapter concerns itself with anatomy and injuries and treatment of the extensor apparatus of the hand. This is followed by a chapter on the skeletal development of the hand and studies of the form and function of some joints of the fingers, and then the chapters again begin to cover the clinical aspects of hand injuries. As is probably unavoidable when several contributing authors cover overlapping subjects, there is repetition in many of the chapters. One of the best chapters in the book concerns tenosynovitis of the hand and wrist, including carpal tunnel syndrome, De Quervain's disease and trigger digit, by Paul Lipscomb of the Mayo Clinic.

The reviewer believes that Part I of the discussion of the hand would have been more understandable had it included a chapter on functional anatomy of the hand. A review of this type would have been benefitted by more emphasis on basic considerations of hand function including biomechanical principles, types of grasp and discussion of implications of loss of various hand functions.

A chapter was included on the studies of the form and function of some joints of the finger and, although this may be of interest to researchers, it seemed out of context.

In the chapter on finger flexor tenodesis, there was no mention of the flexor hinge hand, although the Bisgrove brace, a forerunner of the more sophisticated braces, was mentioned. Unfortunately, emphasis was made of its use in spinal cord injury instead of in poliomyelitis where the intact sensation makes the brace much more efficient.

Chapter 17 describes the psychologic reaction to a severe hand injury, does not logically and conveniently go on to the economic and social aspects of a severe hand injury. It is very difficult to review only one half of a volume on hand injuries because the reviewer can not anticipate what will be included in the next volume. It seems more appropriate to have considered the basic principles in the first section and the clinical aspects in the second part.

Section II, on General Orthopedics, included several articles of interest to orthopedists primarily. Chapter 23, on Dupuytren's contracture, may well have been put in the section on the hand. Section III consists of clinical notes and the last 50 odd pages are devoted to a cumulative index to Volumes 7-12.

The book has an attractive make up and binding. The pictures are especially descriptive.

The justification of a volume of this kind is probably proportional to the excellence of the articles selected, therefore, review articles by recognized authorities are especially appropriate. Volume 13 of Clinical Orthopedics has many items of interest to physicians of all specialties. However, in these days of library space shortage, it would be well to allow the

contributing material to determine the frequency of publication rather than the reverse since there is a tendency to fill the volume with less valuable items. The reviewer, personally, prefers to cut out articles of interest and excellence but, unfortunately, this is undesirable in this handsome volume. (*Ernest W. Johnson, M.D.*)

THE CLINICAL TREATMENT OF JUVENILE AMPUTEES. By *Sidney Fishman; Edward Peizer; Bertram Litt; Jerome Siller, and Sydel Silverman.* Pp. 85, with tables and illustrations. New York University, New York 3, 1958.

The authors have attempted to analyze the experience in 159 upper extremity amputations in patients aged 10 months to 15 years. A total of 33 clinics in 23 states are represented.

There are very great variations in the management as reported. For example, training time ranged from zero to 51 hours for below elbow cases to 133 hours for above elbow cases. Nonetheless, the authors have investigated the results of treatment, the prescription, its effectiveness and problems, standards and training.

The authors' conclusions concerning the need for coordinated studies of a controlled experimental type and standardization of data collection, instruments and treatment procedures are well supported by their earlier observations.

There is a great deal of information which would be helpful to physicians, prosthetists and therapists working with braces and splints as well as prostheses. This book should be available to personnel in all areas dealing with children who have physical disabilities. (*H. M. Sterling, M.D.*)

REHABILITATION CENTERS TODAY. By *Henry Redkey.* Paper. Price, \$1.00. Pp. 231, with illustrations. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., 1959.

This book is the most up-to-date reference now available about rehabilitation centers in the United States and Canada. It is a compilation of information obtained from a questionnaire survey of 77 centers in the two countries. The majority of these centers are members of the National Conference of Rehabilitation Centers (which only after the survey had been taken, has changed its name to the National Conference of Rehabilitation Centers, Inc.). It took approximately two years to compile the material, once it had been received. By the time of publication about 100 centers meeting basic standards discussed in this book, had come into existence. More are being planned, due largely to the influence

and impetus of recent legislation in the U. S. The material furnished is a guide to new centers and a stimulus to old centers, as they compare the structure and activities of other existing centers.

The rehabilitation center concept, philosophy and need for such centers is discussed. Types of centers, basically for physical rehabilitation or for vocational rehabilitation, and for the blind, are identified and differentiated. Costs, source of income, staffing needs, insight into the variety of services possible in a center, and the general principles of integration of services to which all centers aspire, are given consideration in Part I.

Part II gives detailed reports on 65 general rehabilitation centers in 20 independent centers with beds; 31 independent centers without beds; 14 hospital centers. Part III is a discussion of the 77 centers by names and programs. These are grouped by states. The name and address of the center and the name of the director is given. When there is a medical director, his name and specialty is stated. The kind and number of the professional staff are listed, as are the services offered, the types of disability accepted for treatment with any special emphasis stated, source of referrals, training affiliations, research or other individual special consideration listed. It must be kept in mind however, that by this time the list is incomplete for a total center directory.

There is an appendix which gives the instructions for completing the questionnaire, and the questionnaire itself from which the book has been compiled. The index is practical and very complete.

The author, as Secretary of the National Conference of Rehabilitation Centers and in charge of the program of Rehabilitation Centers for the office of Vocational Rehabilitation, was in the most logical situation to have compiled all this important material. He had the assistance of Miss Mary Switzer, Director of the Office of Vocational Rehabilitation; the officers and executives Committee of the Conference of Rehabilitation Centers and Facilities, as well as many other authorities who work in this field.

The present book has been preceded, and is an outgrowth or followup of "Rehabilitation Centers in the United States," published in 1953 by the National Society of Crippled Children and Adults. The present book has been published by the United States government printing office in 1959 and can be obtained by the Superintendent of Documents from that office.

It is recommended reading for personnel in currently operating centers, and is a basis of planning for persons interested in new centers and for all individuals who are desirous of becoming familiar with all the facets of rehabilitation center concepts and operations. (*Nila Kirkpatrick Covalt, M.D.*)

MORE ABOUT THE BACKWARD CHILD. By *Herta Loewy*. Cloth. Price, \$4.75. Pp. 138. Philosophical Library, Inc., Publishers, 15 E. 40th St., New York 16, 1959.

The two previous books by the author, "The Retarded Child" and "Training the Retarded Child" were not available in any libraries in this community. After several readings of the book to be reviewed, the method employed by Miss Loewy in treating backward children is unknown to this reviewer. The book abounds in the personal pronoun "I," and is full of the author's personal ideas as to what should be done about almost every possible facet of living and growing up, but only in relation to a few backward young females. The degree of "backwardness" is not specified. No reports of any psychology are given.

The book is divided into five parts, of which Part V is the "Case Book," in which she brings the case histories of her students up to date. It would appear that the first two books together, covered a total study of only ten students. Eight of the original ten discussed in the first two books are still students and their case histories are brought up to date in the third book. To these, six more students have been added whose case histories are reported for the first time. In other words, it would appear that the author has now written three books on her theories and experience, with a total of only 16 students and all of them girls.

The other four parts included general discussion on such things as religious upbringing and included a plea to the medical profession to give more thought to the backward child; *sex, including masturbation, menstruation, abnormalities, and sex within the family*. In this section Miss Loewy goes into detail about various diagnoses of conditions in some of which she discusses the use and dosage of Milk of Magnesia to bring about relief. One section is concerned with delinquency.

Part IV is "More about Education." One chapter in this section on Education gives specific songs, dances and games played to rhythm. Both the words of the songs and the music are intricate and, I believe beyond those usually used in kindergarten and elementary schools for normal children. A chapter on "Reading Difficulties and Reading Disabilities" is concerned with one child who did mirror reading.

The author appears to be English; the work appears to have been done at Miss Loewy's School, some place in England, it is presumed. Except for dedicating the book to "Dr. Maurice Robinson, faithful G. P. and friend," there are no other professional references. No bibliography is furnished. That Miss Loewy is sincere, no one could ever doubt.

Therefore, in reading the book, one can only assume that whatever Miss Loewy's theory of education is for backward children, the theory is her own. It would seem that

the value of Miss Loewy's theories, or those of "The Herta Loewy Group" should be evaluated by recognized authorities in the field of psychiatry, psychology, and those educators who deal with the mentally defective before her theories can be accepted for general use or her book recommended for general study. (*Nila Kirkpatrick Covall, M.D.*)

VOCATIONAL REHABILITATION FOR THE PHYSICALLY HANDICAPPED. By *Louise M. Neuschutz*. Cloth. Price, \$5.75. Pp. 136, with illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1959.

A small, easily read book with a wealth of information of interest to workers in all phases of rehabilitation, not only those in vocational guidance.

The case reports are interesting; the types of activities that the various disabled have and can be placed in, is revealing both because of their numbers and the diversity of occupations mentioned.

The cardiac, the orthopedic, the amputee, the tuberculous, the blind, the homebound, the elderly and the aged are all discussed in an interesting fashion.

Avoiding accidents on the job and how to find a job and/or succeed in a small business are also included.

Rehabilitation centers and the work of such groups as the American Rehabilitation Committee, Inc., are described.

The history of various organizations that help with rehabilitation concludes this valuable little volume. (*J. L. Rudd, M.D.*)

THE CARE OF THE GERIATRIC PATIENT. Edited by *E. V. Cowdry, Ph.D.* Cloth. Price, \$8.00. Pp. 438. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1958.

This excellent book originated from a symposium on the care of geriatric patients. It consists of 19 chapters by 22 authors. The general trend of their thought is that geriatric patients are a part of the general population, but that they do have specific problems, especially with regard to social relationships. The reviewer is led to conclude that there is great need for an increasing appreciation of geriatric problems on the part of physicians in general, but he is led to believe also that there is not much need for an organized group of specialists in geriatrics except to provide teaching programs in geriatrics in our medical schools.

The book is well written, well printed, and attractively bound in a leatheroid cover. It is recommended as worth-while reading for any physician concerned in any way with the problems of aging.

medical news

Readers are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before date of meeting.

Books Received

Books received are acknowledged in this column as full return for the courtesy of the senders. Reviews will be published in future issues of the journal. Books listed are not available for lending.

Office Orthopedics by Lewis Cozen; **Recent Progress in Hormone Research: The Proceedings of the Laurentian Hormone Conference Vol. 15** edited by Gregory Pincus; **Arthritis: General Principles Physical Medicine and Rehabilitation** by Edward W. Lowman; **Psycho-Therapy and Society** by W. G. Eliasberg; **Symposium on Pulmonary Ventilation: Papers and Discussion** edited by R. P. Harbord and R. Woolmer; **Recreation in Total Rehabilitation** by Josephine L. Rathbone and Carol Lucas; **Principles of Disability Evaluation** by Wilmer Cauthorn Smith; **Die Physik und ihre Anwendung in Medizin u. Biologie** by Walter Beier and Erich Dörner; **Adapted Physical Education in Schools** by Ivalclaire S. Howland; **The Foot and Ankle** by Philip Lewin; **Hypertension** by John Moyer; **Trauma** by Harrison L. McLaughlin; **Gray's Anatomy** by Henry Gray; **Clinical Orthopaedics No. 14** by Albert B. Ferguson, Jr.; **Kinesiology and Applied Anatomy** by Philip J. Rasch and Roger K. Burke; **Orthopaedic Surgery** by Sir Walter Mercer; **Relaxation and Exercise for Natural Childbirth** by Helen Heardman; **Current Medical References** by P. J. Sanazaro; **The Chemical Elements** by Helen Miles Davis; **Cooperative Programs of Training and Research in Mental Retardation** by Darrell A. Hindman; **Anatomy and Physiology, Vol. 2** by Edwin B. Steen and Ashley Montagu; **Atlas of Human Anatomy** by Franz Frohse; **Max Brodell and Leon Schlossberg; Survey of Employers' Practices and Policies in the Hiring of Physically Impaired Workers** by Federation Employment and Guidance Service; **Precis D'Electromyographie** by J. Dumoulin and Ch. Aucremanne; **Beschäftigungstherapie, Einführung und Grundlagen** by G. Jentschura.

Newly Registered Therapists

August 28, 1959

Mayo Clinic

Aarestad, Darlene M., Bigfork, Mont.
 Bagley, Phyllis A., 232 W. Porphry St., Butte, Mont.
 Barger, Sharon Lee, 234 10½ St., S. E., Rochester, Minn.
 Barney, Sharon C., Elizabeth Kenny Institute, 1800 Chicago Ave., Minneapolis
 Bondurant, Julia K., 4101 Pratt St., Omaha
 Carter, Nancy L., The Crippled Children's School, Jamestown, N. D.
 Clunie, Gwendolyn J., 985 St. Andrew Rd., Saginaw, Mich.
 Coffee, Mary Ann, Star Rte., Leavenworth, Wash.
 Duston, Dixie Lee, 330 15th Ave., S. W., Rochester, Minn.
 Erickson, Beverly Ann, 117½ 12th Ave., N. W., Rochester, Minn.
 Getz, Linda A., 214 16th Ave., S. W., Rochester, Minn.
 Gould, Barbara J., 9 Richmond Ave., New Haven, Conn.
 Hayes, Arthur E., 537 Pemberton Ave., Lexington, Ky.
 Humphrey, Leroy D., 7755 West View Dr., Lakewood, Colo.
 Johnson, Mary S., 1913 Columbus Ave., Minneapolis
 Klebe, Delura A., 736 2nd St., S. W., Rochester, Minn.
 Klein, Alberta M., 2849 N. 109th St., Toledo, Ohio
 Laffaw, Sally Ann, 1948 Blue Ridge Dr., Seattle
 Lalim, Andrew, 9915 Fremont Ave., S., Minneapolis
 Lively, Virginia Jo, 672 Breys Ave., Salem, Ore.
 McClatchie, James G., 1025 Robert St., Lafayette, Ind.
 Price, Janice G., 609 W. Rosewood Ct., Ontario, Calif.
 Retherford, Virginia M., 3168 Nortonlawn, Rochester, Mich.
 Rinde, Mary Louise, 1406 N. Broad, Fremont, Neb.
 Scott, Joey L., 102 Grove Ave., Beckley, W. Va.

Shufelt, Allan R., 413 W. Center St., Rochester, Minn.
 Squire, Paula D., 402 Hancock St., Sandusky, Ohio
 Turner, Fred J., 165 169th St., Hazel Crest, Ill.
 Vestal, Kelly J., Box 314, Jonesville, N. C.
 Volk, Marcia L., 736 2nd Ave., S. W., Rochester, Minn.
 Wagner, Merlee N., 601 E. Clark St., Champaign, Ill.
 Ward, Mary G., Box 896, Glens Ferry, Idaho
 Williams, Rob R., 1019 W. 11th St., Hastings, Neb.

September 18, 1959

Marquette University School of Medicine

Huot, Mary L., 964 S. Evergreen Ave., Kankakee, Ill.
 Karas, Elizabeth M., 3907 W. Addison St., Chicago
 Laubach, Barbara M., 1835 N. 39th St., Milwaukee
 Novasic, Thomas F., 1930 W. Mitchell St., Milwaukee
 Petrykowski, Claudia A., 11320 Arrowhead Trail, Hales Corners, Wis.
 Schweitzer, Kathryn H., 2157 S. 34th St., Milwaukee
 Siegrist, Laura T., 4051 N. 23rd St., Milwaukee
 Stefanowski, Carol M., 1819 Manitoba Ave., South Milwaukee
 Varney, Mary J., 224 Hubbell St., Houghton, Mich.
 Waldschmidt, Janet C., 5665 N. Bay Ridge Ave., Milwaukee

September 30, 1959

University of Buffalo

Edmonds, Richard H., 400 Dewey Ave., Buffalo

University of Toronto

Cohen, Gay, 1447 W. Touhy Ave., Chicago

October 9, 1959

University of Connecticut

Silverstein, Barbara May, 171 S. Orange Ave., South Orange, N. J.

Marquette University

Marchek, Francis J., 8903 W. Wisconsin Ave., Wauwatosa, Wis.
 Moran, Patricia Jean, 2524 Saratoga Dr., Louisville, Ky.

University of Michigan

Anderson, Janice Dee, 10300 Crocuslawn, Detroit
 Austin, Lu Anne, 615 E. Grand River, Laingsburg, Mich.
 Beger, Valerie J., 3565 E. Forest Ave., Detroit
 Braverman, Elaine J., 18275 Indiana, Detroit

Dubbs, Mary Martha, 1619 Lyon St., Flint, Mich.
 Exelby, Carolyn Ann, 923 Sherman Ct., Ypsilanti, Mich.
 Huey, Lois May, RR No. 2, Three Rivers, Mich.
 Hyma, Beata Maria, 1301 Forest, Ann Arbor, Mich.
 Jardine, Shirley Ann, 35986 Jefferson, Richmond, Mich.
 Koch, June A., 513 Radcliff Circle, Deerfield, Ill.
 Lystad, Anita F., 922 S. Vale, Bloomington, Ill.
 Moody, Vernice D., 1120 W. Addison St., Chicago
 Shawaker, Sarah Jeanne, 2936 Pembroke Rd., Toledo, Ohio
 Stark, Donna Jean, 3313 Dupont, Flint, Mich.
 Stashak, Barbara Ann, 25 W. Somersite St., Raritan, N. J.
 Stetec, Sallie H., 2700 Reeds Lake Blvd., S. E., Grand Rapids, Mich.
 Strumia, Lucia J., 16155 Petos Key, Detroit

Recent Publications by Members

The following papers were published in the *Journal of the American Medical Association*:
 Carrie E. Chapman and co-authors, "Follow-Up Study on a Group of Older Amputee Patients"; July 18, 1959.

Earl C. Elkins and co-authors, "Sweat Patterns and Skin Temperatures in Patients"; September 26, 1959.

Arthur L. Watkins, "Prevocational Evaluation and Rehabilitation in a General Hospital"; September 26, 1959.

Jerome S. Tobis, "Physical Medicine and Rehabilitation Management in Aphasia"; September 26, 1959.

Manfred R. M. Blasby and co-author, "Orthokinetics: A New Receptor Facilitation Method"; The American Journal of Occupational Therapy, September-October, 1959.

Michael M. Dacso and co-authors, "Arteriosclerotic Heart Disease: Panel Discussion as Presented at Fifth Annual Seminar. Bull. Huron Road Hospital"; Cleveland Clinic Quarterly, July, 1959.

Earl C. Elkins and co-authors, "Use of the Hubbard Tank as an Adjunct in the Management of Severe Burns"; Minnesota Medicine, August, 1959.

Leonard J. Yamshon, "Physical Medicine Following Radical Mastectomies"; The Western Journal of Surgery, Obstetrics and Gynecology, July-August, 1959.

Emery K. Stoner, "Resistive and Body-Building Exercises"; The Pennsylvania Medical Journal, July, 1959.

Odon F. von Werssowetz and co-author, "Early Mobilization of the Recumbent Patient Using a Standing Bed"; Texas State Journal of Medicine, July, 1959.

Donald L. Rose, "Safe Practices in the Physical Therapy Department"; *Physical Therapy Review*, October, 1959.

The following papers were published in the *Military Medicine*, official journal of the Association of Military Surgeons of the United States, September, 1959:

Charles D. Shields, "Panel on Rehabilitation."

Aniello F. Mastellone, "Physical Medicine in the Army: History and Development."

Louis B. Newman, "Dynamic Physical Medicine and Rehabilitation in the Veterans Administration."

Frederick E. Vultee, "Rehabilitation of the Amputee."

Typewriter for Handicapped

A remote-control typewriter that may revolutionize the lives of many handicapped persons is on a "trial run" at the Bronx Veterans Administration hospital, Bronx, N. Y.

While the results are yet too early for evaluation, the typewriter suggests exciting possibilities for paralyzed patients.

For the first time this new mechanism is being given a practical test among patients at the VA Hospital. It has been installed for a three-month test and at the end of that time it can be decided whether the machine can have widespread application.

The machine, labeled a "Grafoton" by Dr. Allan Ziskind and his brother Richard of New York, who developed it, is operated by a beam of light from a lamp attached to the patient's forehead. Moving the beam of light across an upright "keyboard" causes transmission of impulses which reproduce the type-written letters. Behind each letter is a photoelectric cell which when hit by the light beam activates a relay which depresses the letter or symbol wanted. Only one key is depressed at a time, and the beam can be adjusted for maximum accuracy. The Grafoton actually is operated by the head and neck muscles. The patient plays the light beam over a vertically-

mounted panel displaying the letters and symbols of the IBM right-handed typewriter keyboard. Single experiments have demonstrated that the machine is practical if the patient can adapt psychologically to the requirements. Even a severely disabled person may turn out 30 words per minute, a fair speed for a beginner typist.

The typewriter was developed at the Boston University School of Medicine and Boston City Hospital. It has been demonstrated also at the New York University-Bellevue Institute of Physical Medicine and Rehabilitation.

One patient, a nine-year-old boy, suffering from arthrogryposis, or congenital deformity, of both wrists, after a few minutes practice with the Grafoton typed a 25-word sentence in two minutes and forty-five seconds. Previously, using a standard typewriter, he had required six months to perfect the same sentence. When using the standard typewriter it had been necessary for him to hold his sleeve in his mouth and wag his hand back and forth across the keyboard.

Bulova Gives \$2,000 Grants to Adelphi College Seniors

The Joseph Bulova School of Watchmaking, Woodside, Long Island, N. Y., the nation's only school that offers a tuition-free course in watch repair and precision skills to physically handicapped persons, has awarded fellowship grants to two physical education seniors at nearby Adelphi College. Recipients of the grants — for \$2,000 each — will assist in the recreation and rehabilitation programs at the Bulova school several nights a week during their senior year.

The school was founded in 1945 and has graduated more than 600 paraplegics and other veterans and civilians disabled by physical handicaps. The school's program is supported by the Bulova Watch Company Foundation, Inc.

abstracts

Two Cases of Diabetic Arthropathy. O. Aagenas, and N. R. Haagensen. *Ugesk. laeger* 121:572 (April 1) 1959.

This is the first report of diabetic arthropathy from Denmark. Two cases are studied. Both cases were long-termed juvenile diabetes complicated with retinopathy, nephropathy and neuropathy. In both cases the autonomic nerve system was involved. There was no perspiration below the knees and Gibbon-Landis test showed very slow fall in temperature of skin when the legs were exposed to cold and no rise in temperature after indirect heating. The patients had a "functional" sympathectomy.

The arthropathy was located at the tarsal bone. Biopsy from the bone showed hyaline thickening of the walls in the small synovial vessels.

Although the arthropathy is seen in patients with neuropathy this is not believed to be the only cause. The micro-angiopathy may very well be of pathogenic significance. The only treatment has been immobilization. One patient improved on this treatment.

Congenital Nasofrontal Encephalomeningoceles and Teratomas. Courtland H. Davis, Jr., and Eben Alexander, Jr. *J. Neurosurg.* 16:365 (July) 1959.

The authors present seven cases of tumors or masses presenting in the nasal, frontal or orbital area in children, pointing out the rarity of the condition which leads to faulty recognition and errors in management.

Preoperative differentiation by clinical examination or x-ray may not be possible, and aspiration of fluid or biopsy of the mass may cause meningitis. They recommend exploratory craniotomy as the first approach to such tumors, followed by local excision once the dura has been closed, either at the same operation or later. Attempts at local excision before intracranial closure of the dura are contraindicated because of technical operative difficulties as well as the cerebrospinal fluid rhinorrhea and meningitis which often occur.

The Failure of Anticoagulant Therapy to Prevent Coronary Thrombosis after Long-Term Use and in Impending Myocardial

Infarction (With Case Reports). R. J. Condry. *West Virginia M. J.* 55:319 (Sept.) 1959.

According to many reports, anticoagulant therapy has been most beneficial in acute coronary thrombosis. Long-term use of anticoagulant therapy has also proved beneficial in preventing future attacks, so the reports stated. This paper deals with the failure of such drugs to prevent myocardial infarction and coronary thrombosis. It reemphasizes the fact that coronary thrombosis is far from solved, and points out that there are certain dangers to be reckoned with in using anticoagulant drugs in this disorder.

Low Back Pain. Thomas P. Goodwyn. *J. M. A. Georgia* 48:407 (Aug.) 1959.

In discussing low back pain, none of the diseases commonly associated with the spine as a whole are included such as tuberculosis, rheumatoid or degenerative arthritis, neoplasm, Marie-Strumpell disease, etc.

When a patient has a history of repeated bouts of low back pain, each one becoming more severe and occurring more frequently, it is reasonable to suspect a disc lesion.

In order to evaluate the difficulty encountered, a most important factor is to learn the patient's tolerance for pain.

Clinical Aspects of Aging Connective Tissues. Edgar M. Bick. *Bull. New York Acad. Med.* 35:547 (Sept.) 1959.

In the structure and function of all the separate organs and locomotor mechanisms of the human body, the connective tissues take part. Very little attention is paid to connective tissue as an organic system, even though it plays a large part in the nature of deformity and dysfunction following disability of prolonged disease or trauma.

So-called resistance exercises are more or less futile in elderly people — in fact they retard rather than accelerate. The daily increase of purposeful activity has been encouraged since it seems to produce a more rapid recovery with less discomfort.

Whiplash Injury. George Stuart Hackett. *Am. Pract. & Digest Treat.* 10:1333 (Aug.) 1959.

Weak ligaments and tendons cause most chronic neck pain and referred pain in face and fingers. About 80 per cent of these can be cured.

As far as diagnosis is concerned, trigger points of pain and areas of referred pain are valuable in that they direct attention to the origin of pain in the ligaments and tendons.

Relaxation of ligaments and tendons can be accomplished by prolotherapy of the rehabilitation of an incompetent structure by inducing proliferation of new cells. This method was successful in over 80 per cent of the cases treated.

Hypaque in Cerebral Angiography. Samuel J. Brendler, and George J. Hayes. *J. Neurosurg.* 16:454 (July) 1959.

The authors report on 617 intracranial angiograms done on 420 patients, describing technic, volume of dye used, and duration of sessions. Any new abnormal neurologic signs or symptoms occurring during the procedure, within 48 hours after the procedure, or prior to neurosurgery if it was performed within 24 hours was counted as an incident provoked by the procedure.

There were no deaths or permanent neurological sequelae. There were two instances of transient hemiparesis, sixteen of seizures, and one of severe headache, and all symptoms appear to have disappeared in a matter of minutes.

Effects of Temperature on Function of Mammalian (Rat) Muscle. Alexander N. Doudoumopoulos, and Paul O. Chatfield. *Am. J. Physiol.* 196:1197 (June) 1959.

The purpose of this study was to investigate the effect of temperature change in the function of a mammalian neuromuscular preparation.

The gastrocnemius muscle of rats was studied in vivo. The sciatic nerve was severed in the thigh and stimulated with Ag-AgCl electrodes. The gastrocnemius tendon was severed and connected with a Grass strain gauge. The output was led to a cathode ray oscilloscope. The muscle was stimulated directly through a copper wire inserted in the muscle. Temperature was changed by bathing the muscle in Ringer's solution of different temperatures and the temperature in the muscle was registered by inserting a copper-constantan needle thermocouple into the muscle. All stimuli to either nerve or muscle were supramaximal shocks originally one millimeter per second in duration. Blockage of

neuromuscular function was done with curarization. Four different temperatures were used and in each experiment the muscle was stimulated with shock — between one and 60 shocks per second.

In general the muscle developed more tension when cooled between certain temperature limits and when stimulated between certain frequency limits. The result was the same in direct and indirect stimulation, indicating that the neuromuscular junction was not the critical point.

The observation may be an explanation why myotonic patients have increased difficulties in cold weather. The authors also raise the question whether in diseases such as myasthenia gravis the place of the disorder is not in the contractive mechanism itself rather than the neuromuscular junction.

Stress-Relaxation in Mammalian Gastrocnemius Muscle. J. D. Thomson. *Am. J. Physiol.* 196:1088 (May) 1959.

The tension level in the lateral, medial and whole gastrocnemius is studied under the same degree of stress (five mm. from resting length) and at three different rates. It was found that both the lateral head and the medial head reach higher levels of passive tension with faster stretches because the faster the stretch, the more resistance the muscles offer, which means that there is very little "give" or readjustment of the internal structure in the muscle under rapid stretch.

The stress-relaxation was also studied under the same conditions and it was found that the tension lost in the first 30 seconds of the stress-relaxation (the fast SR) is the greater the faster the previous stretch rate. This was due to the lesser amount of tension lost by "give." There is no significant difference in the tension lost between 30 and 180 seconds. (slow SR) with the three different speeds. The residual tension at 180 seconds is greatest where fast stretch has been used.

The following parallels are drawn:

Fast stretch → high attained tension
→ greater fast SR → highest 180 second residual tension level.

Slow stretch → low attained tension → less fast SR → lowest 180 second residual tension level.

Throughout the whole experiment, it was found that the tension in the medial head was greater than in the lateral head and that the behavior of the whole muscle was more affected by the lateral head than by the medial head.

It is suggested that the contractile component is responsible for the fast SR and the noncontractile for the slow SR.



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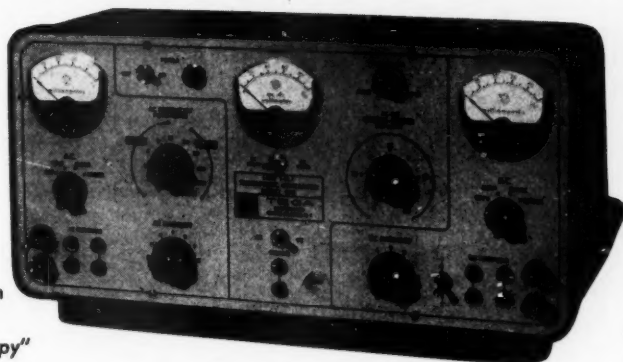
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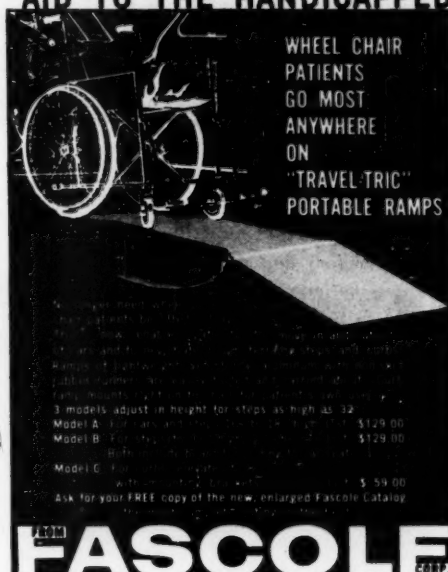
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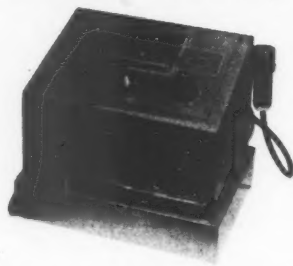


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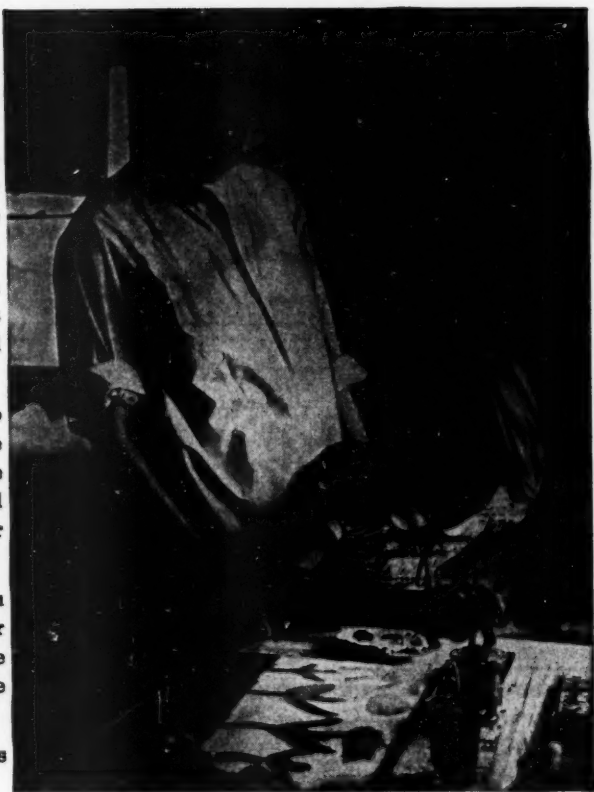
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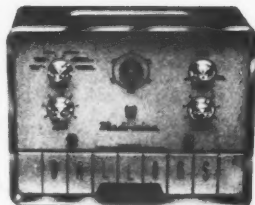


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